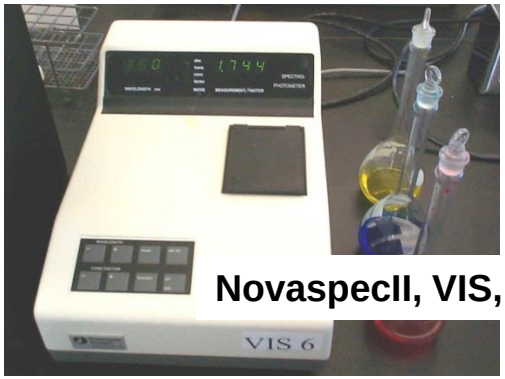
Beckman DU 730, UV/VIS at BRDG x 3

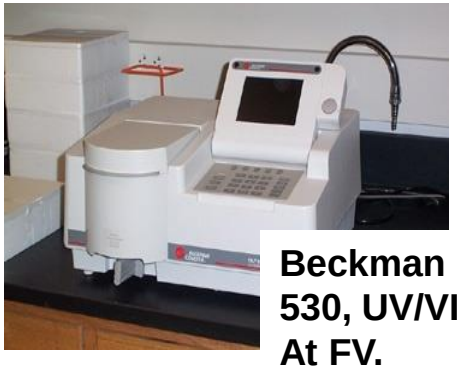
ThermoSci, Genesys 10S-UV-Vis x 4 @ BR

Bio-Rad, SmartSpec Plus @ BR

Spectrophotometry SOPs



NovaspecII, VIS, @FV



Beckman DU 530, UV/VIS At FV.

Nanodrop @ BR x 2

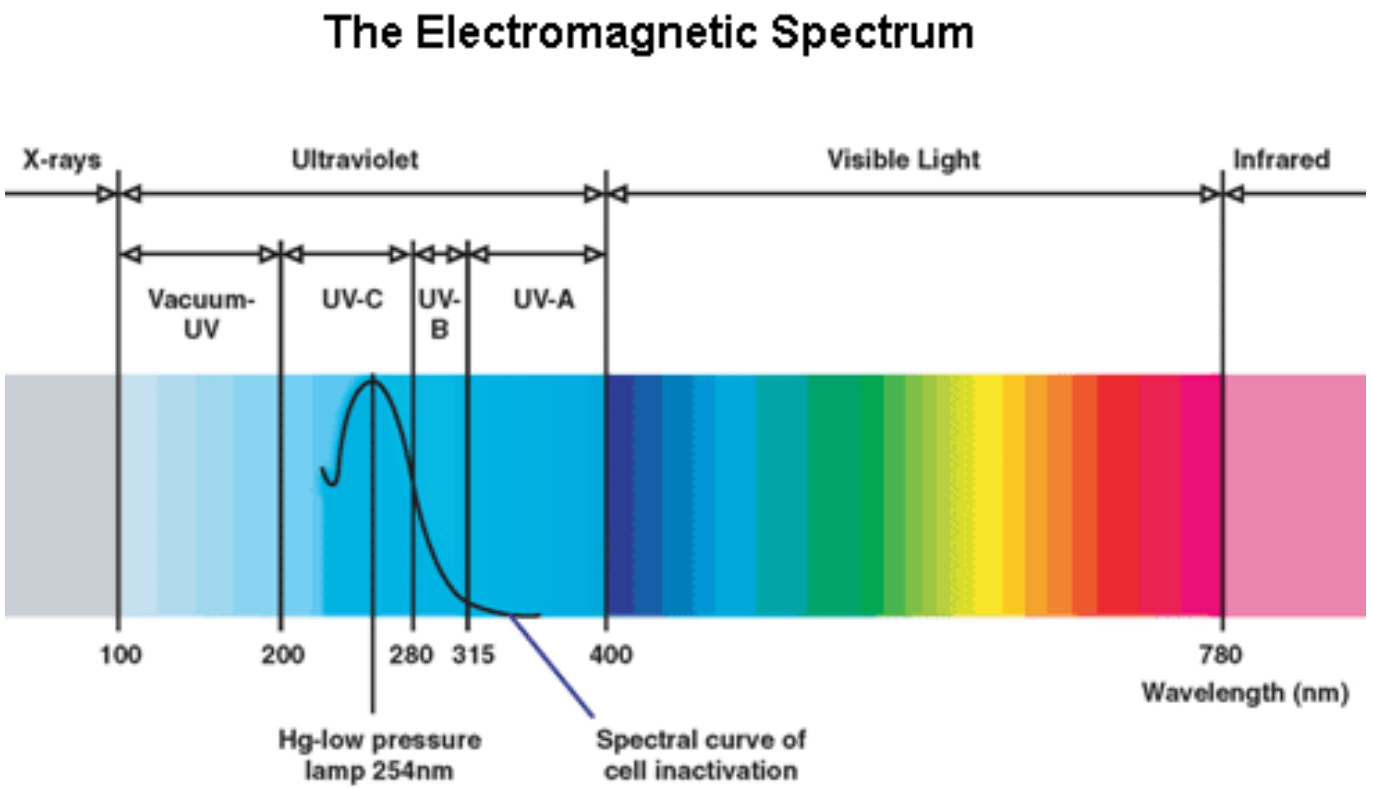
Prepared by: Bob Morrison
FVCC, Instrumentation Specialist

Original **May 2008, Last Revision June 2015, add Genesys**

Spectrophotometer: Service/ Maintenance Recommendations

Ace Lab Systems

1550 S. Kingshighway St. Louis, MO 63110
Tel.: (314) 771-7272 Fax: (314) 771-6956
Email: Tammy tammyc@AceLabSystems.com (Nov 2010)



Spectrophotometry: DU 730, Description

On/off Toggle Upper Left Rear Panel

Save/Print Data ; Right rear panel USB Ports; 2 type A, 1 type B, Flashdisk required.

Cell or Carousel Holder Well

Main Menu Control Panel

Physical and Environmental
Width 45 cm (17.7 in)
Height 20 cm (7.9 in)
Depth 50 cm (19.7 in)
Weight 15.5 kg (34.2 lbs)
Operating Requirements 10 to 40°C (50 to 104°F), max. 90% relative humidity (non-condensing)
Power and Interface Connections

Power 100 to 120 V; 200 to 240 V; 50/60 Hz; automatic changeover
Ports USB 1.1

Performance Specifications
DU Series 700 UV/Vis Scanning Spectrophotometer
Operating Mode Absorbance and Transmittance (%T)
Source Lamp Deuterium (UV) and Tungsten (visible)
Wavelength Range 190 to 1100 nm
Wavelength Accuracy + 1 nm from 200 to 900 nm
Wavelength Calibration Automatic
Scanning Speed Depending on selected resolution (100-4500 nm/min)
Wavelength Resolution Selectable Interval (0.1, 0.2, 0.5, 1.0, 2.0, and 5.0 nm)
Spectral Bandwidth ≤ 3 nm
Photometric Readout -0.3 to 3.0 Å or 0.1 to 100 %T
Photometric Accuracy + 0.005 Å at 0.0 to 0.5 Å
1% at 0.5 to 2.0 Å
Photometric Linearity < 0.5% at 2.0 Å
≤ 1% at > 2.0 Å
Stray Light > 3.3 Å or < 0.05%T with KI-solution at 220 nm

System Configuration: SN 1283669, Ver. 1.05 (40)

Link to Beckman DU 700 Series Users Guide ..(pdf)

Spectrophotometer: DU 730 General Instructions

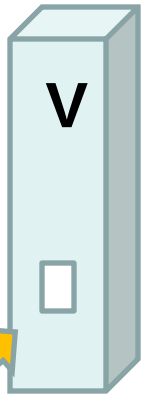
1. Leave the sliding lid closed until you are ready to insert cuvette for a reading
2. Turn on the device, rear upper left side, toggle switch.
3. **Install a Flashdisk in an open USB port if printed results are needed.**
4. Observe Basic System Checks, pass or fail, on the display screen
5. Prepare Blank and Sample, be careful not to touch the clear sides of the cuvettes. Label the stopper for each S (sample) or B (blank)
6. On the Main Menu screen, select “Instrument Setup” to inspect and/or reset previous settings on items like use of the carousel.
7. On the Main Menu screen, select the general category of use (Nucleic Acid, Protein Assay, etc.)
8. Follow the Menu options to enter dilution factors and other setting values.
9. **UV Lamp Warm Up is required before reading “blank” and samples**
   - **Observe UV-VIS box in upper right. The “UV” will blink until the lamp is warmed up and ready for Blank and Sample reading.**
10. **Insert cuvettes making certain that the “V” symbol or face is pointed toward the front of the device. The UV-VIS light path is front to back in the cell.**
11. Ensure that the lid is totally closed after inserting/removing cuvettes, stray light can void results.

Spectrophotometry: DU730, Lid, Loading cuvettes

Slide to door/lid toward the rear to access the single or carousel adapter for your cuvette.

Make sure that the "V" symbol or indicator on the cuvette for the light path is facing forward.

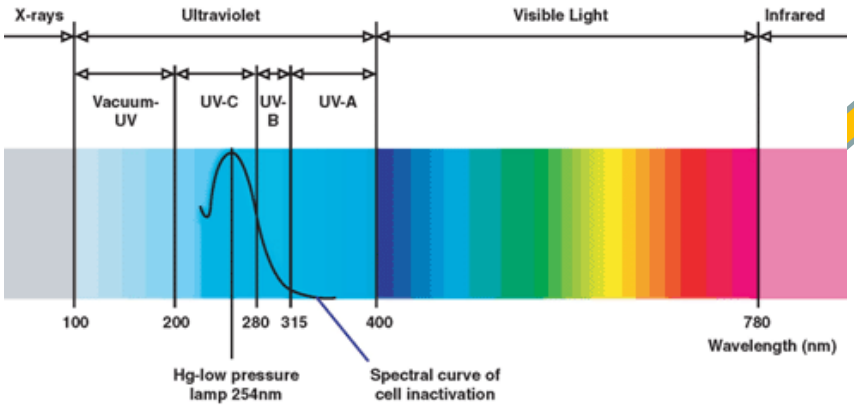
Securely Close lid after inserting cuvette(s).



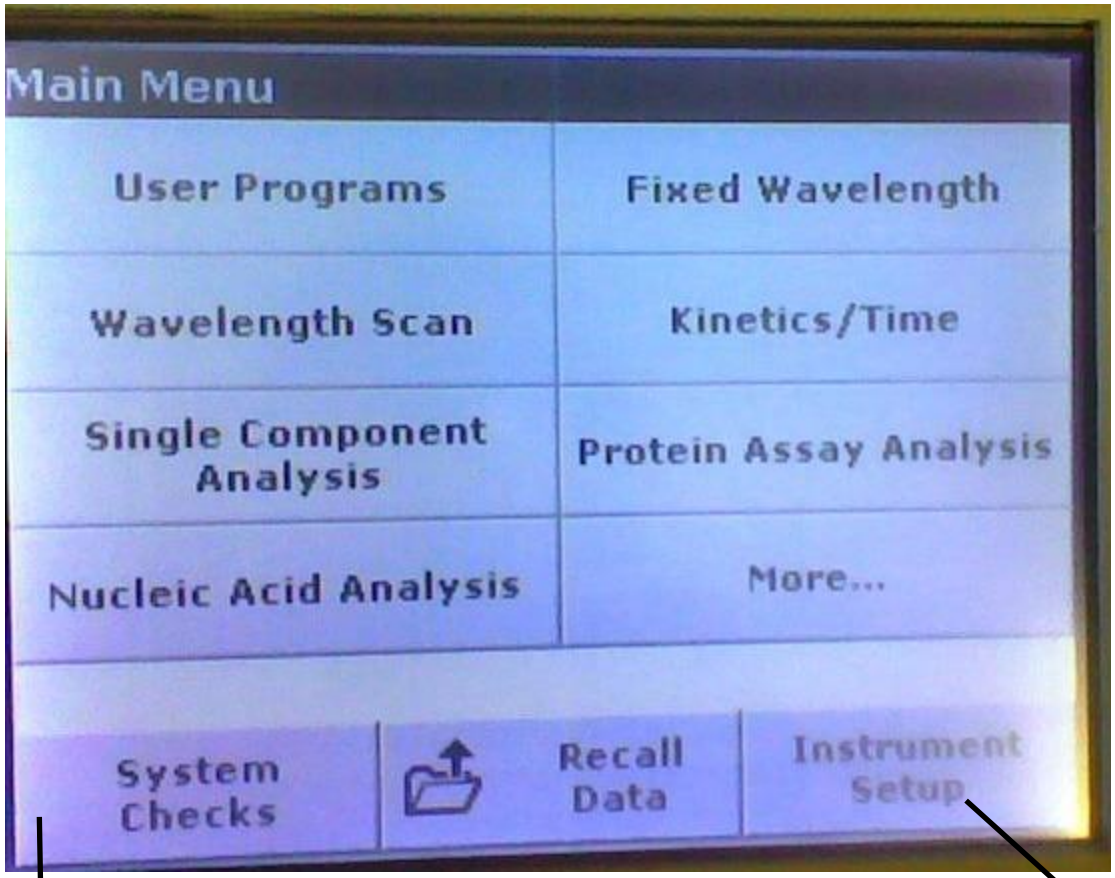
Light path, front to rear

170-2510
Pkg of 50, individually packaged, disposable UV-transparent cuvettes, DNase and RNase free, volume range 50–1,500 µl

The Electromagnetic Spectrum



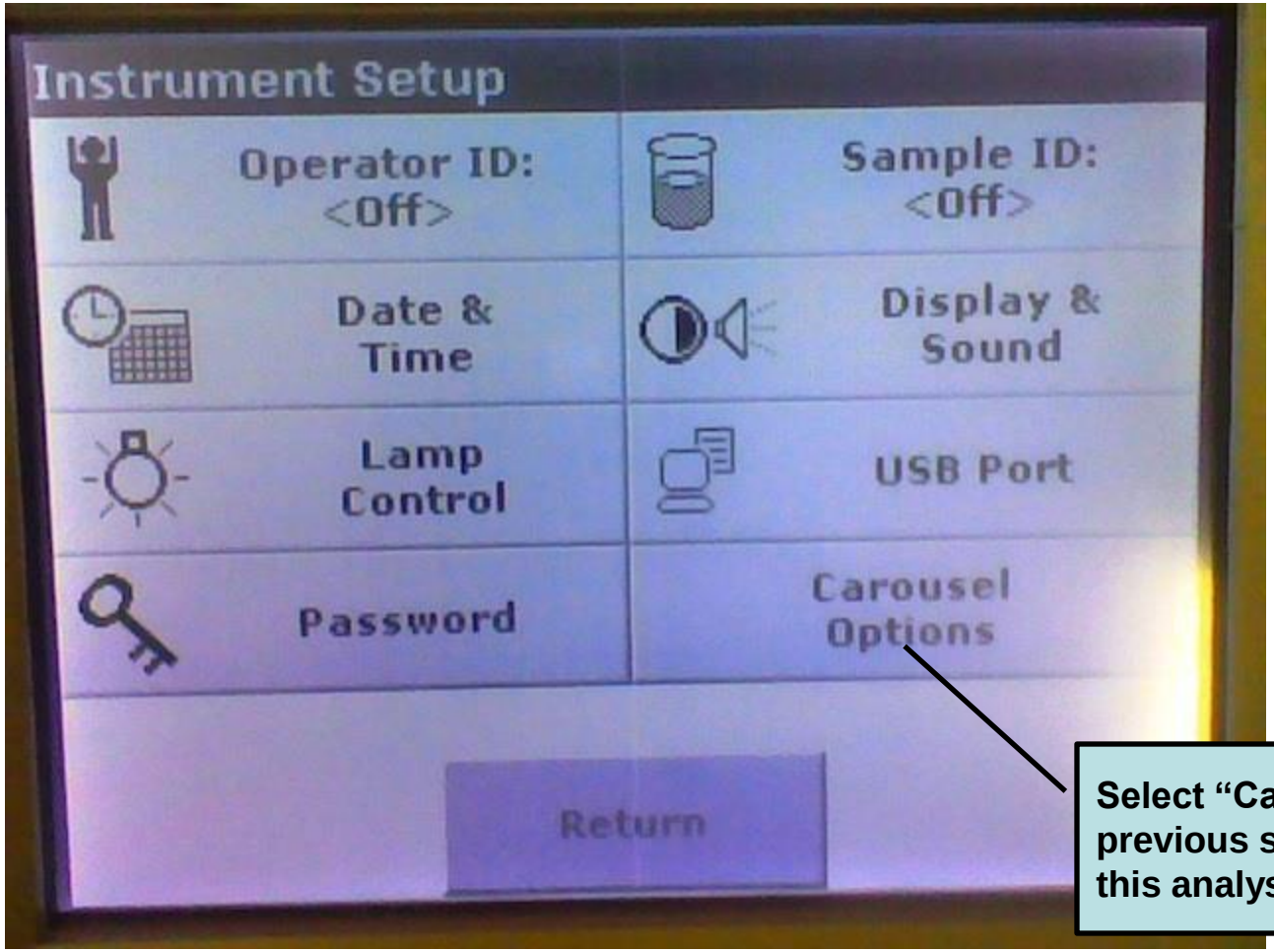
Spectrophotometry: DU730, Main Menu, Select Instrument Setup



Use this option only if you are concerned about system performance or results.

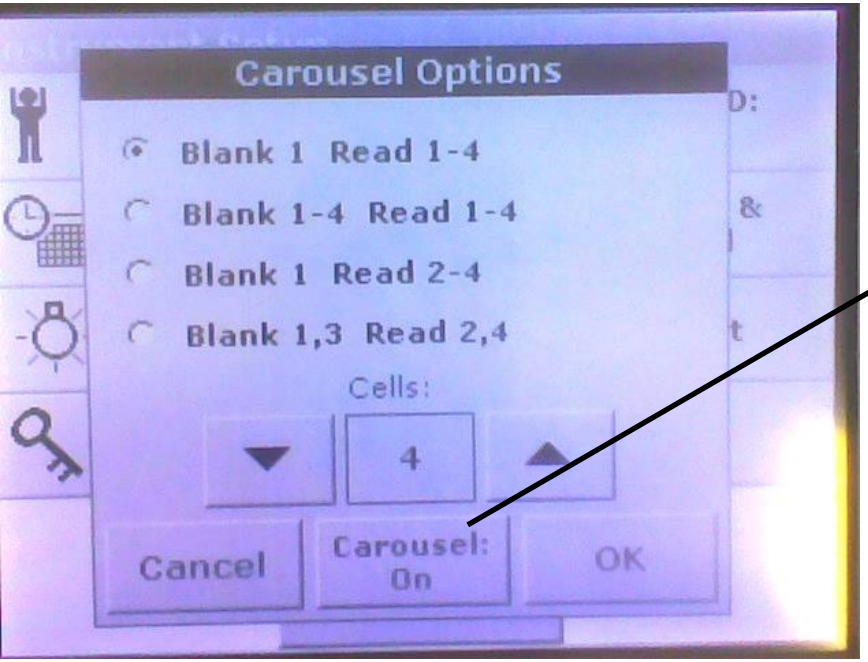
Select "Instrument Setup" to verify or reset basic features like the use Of a carousel or not, date/time, etc.

Spectrophotometry: DU730, Instrument Setup Menu



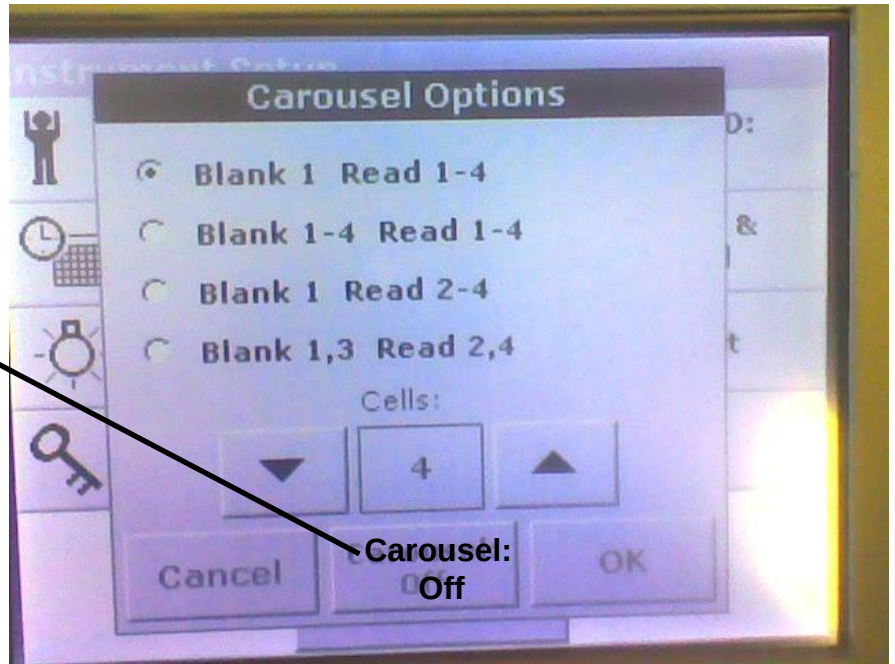
Select “Carousel Options” to see previous settings and/or reset for this analysis

Spectrophotometry: DU730, Carousel Option Settings

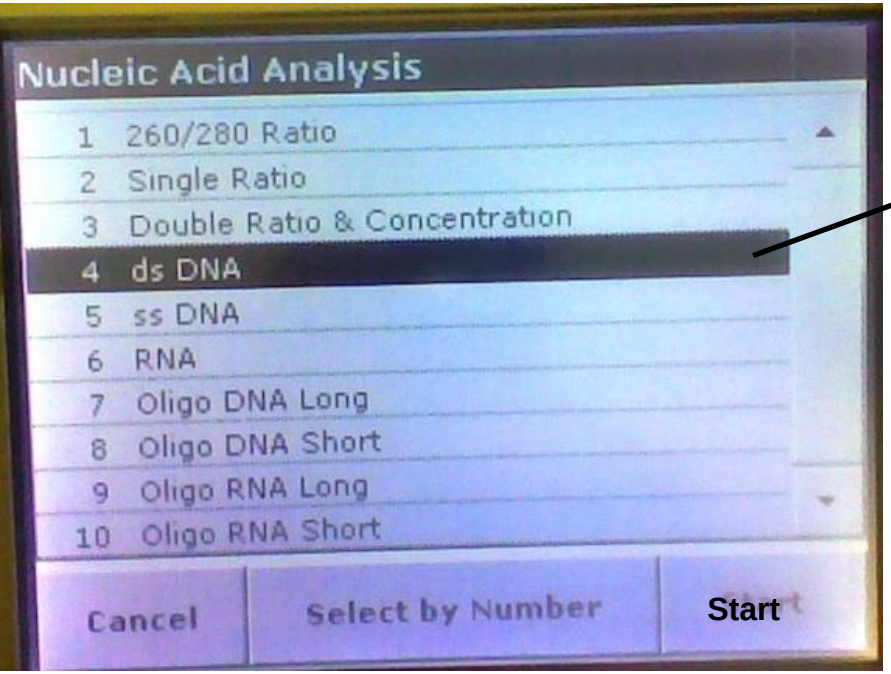


Verify or reset use of Carousel, "on" or "off" using this toggle and up/down arrows.

Carousel "Off" for use with a single sample for each analysis. Select "OK" when desired status is set.

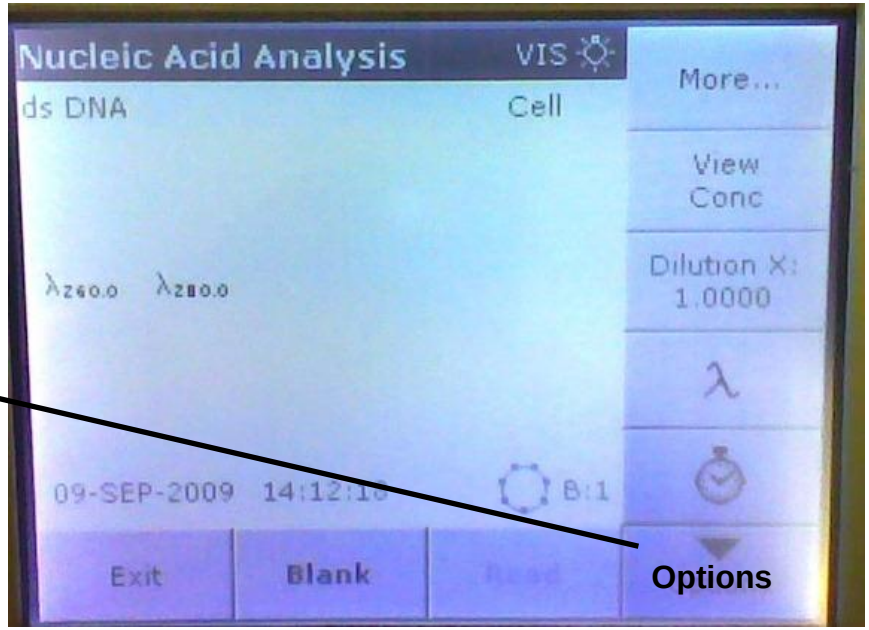


Spectrophotometry: DU730, Nucleic Acid Example; Select Options

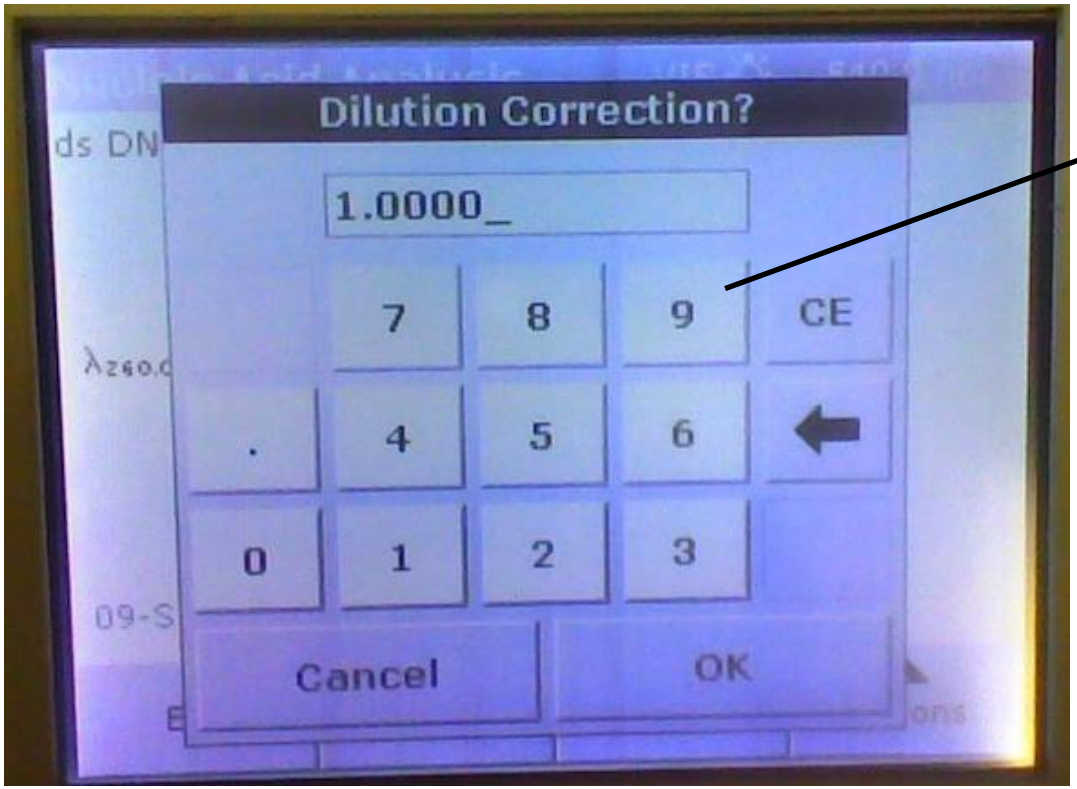


Select "Start" or "Select by Number" to scroll to the desired type of analysis/sample.

Select "Options" to enter items such as Dilution Factors or to see other options select "More"….

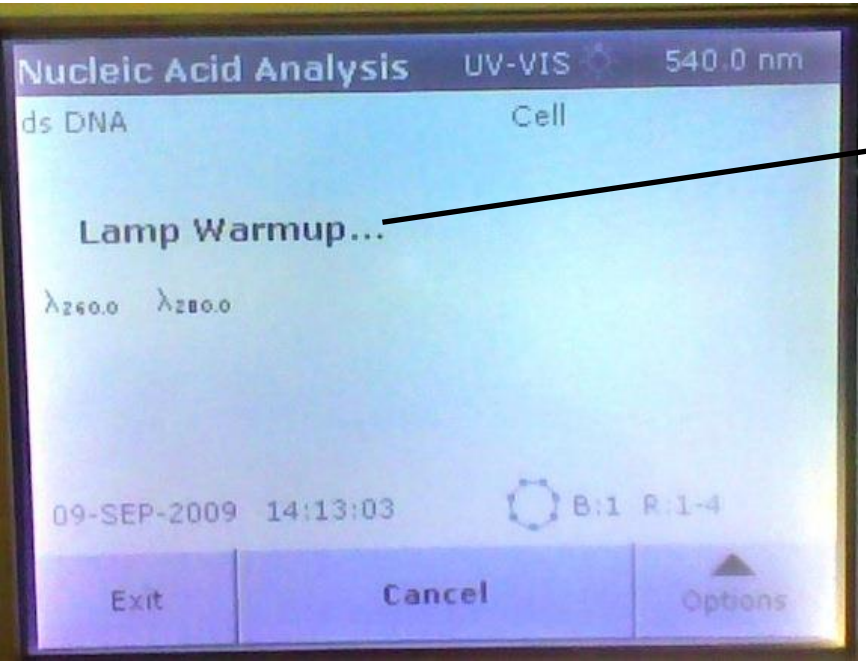


Spectrophotometry: DU730, Options, Dilution, Keyboard

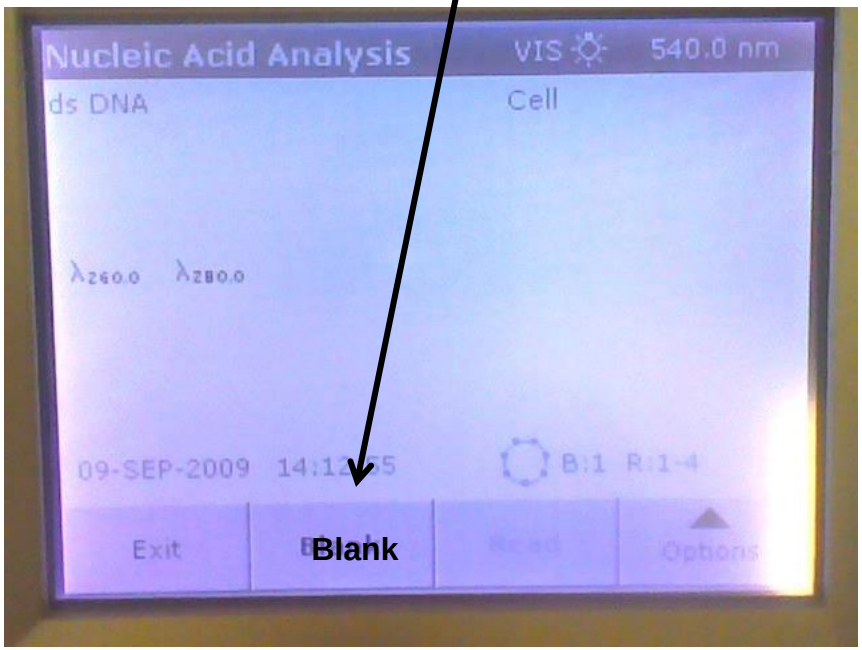


Use numeric keyboard to enter factors, then select “OK” when done

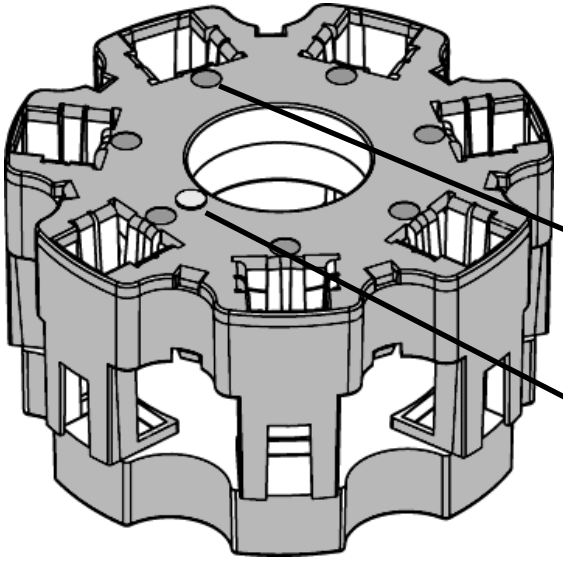
Spectrophotometry: DU730, Lamp Warm-up Messages



After selecting "Blank" or "Sample", a UV Lamp Warm-up message may appear. Wait until the UV-VIS message stops blinking and the menu shows "Blank" before trying to proceed.



Spectrophotometry: DU730 Carousel Cell Holder



The Carousel Cell Holder (Part no A23620) allows you to load up to seven cuvettes of solution into the instrument for analysis at one time. The cuvettes can be various combinations of blanks and samples. Use the Setup Mode to activate the Carousel Options and set up the number of cell positions used and the orientation of blanks and samples.

Position numbers: 1 - 7 stamped on cuvette slot

Alignment tab (yellow dot) on carousel must be aligned with similar tab/dot on compartment below.

Carousel Holder Installation:

1. Open the cell compartment.

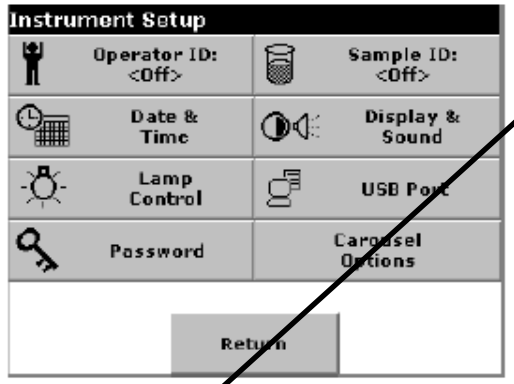
2. Place the Carousel Holder on the rotatable attachment on the bottom of the cell compartment so that the marking faces upward.

3. Take care to position the holder exactly. The Alignment Tab (yellow) on the holder and the rotatable attachment must line up exactly.

4. Turn the holder slightly to the left or right until the guide key locks into position. This establishes contact with the instrument. (For instrument setup options and procedures, see "Carousel and Module Options" on the next slide).

Spectrophotometry: DU730 Carousel Setup

Technical Note: In testing, only the first option Blank 1, read 1-7 was selectable. This is being investigated
BobM 4/7/09



If your instrument includes a Carousel Holder, the Instrument Setup menu includes **Carousel Options**. You can activate the Carousel Holder and modify the carousel parameters using in this menu.

1. Activate the Carousel Holder:
   a. Touch **Carousel Options** in the Instrument Setup menu.
   b. Touch **Carousel: Off** to change its display to **Carousel: On**.
   c. Touch **OK** to confirm your selection.

2. Set the carousel options:
   a. Touch **Carousel Options** and touch
   b. Select the carousel option of your choice.

   For example, the first option is **Blank 1 Read 1-7**, which means that the blank cuvette will be read in position 1 while samples must be placed in the cell positions 1-7. With this option, you must remove the blank cuvette after blanking.
   c. Use the arrow keys to specify the number of cell positions you want to use.

3. Touch **OK** to confirm and return to the Instrument Setup menu.

NOTE As an alternative, you can access the Carousel Options screen directly from the measurement mode by touching the **Carousel** Icon on the bottom-right of the screen. The Carousel Options screen appears and you can quickly make the necessary changes.

Spectrophotometry: DU730, Main Menu Options, pg 1/2

Address http://users.stlcc.edu/departments/fvbio/Spectrophotometer_DU700_Manual.pdf Go
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Table 3.1 Main Menu Soft Key Options

Soft Key	Operation Mode
User Programs	The User Program mode lets you recall saved programs.
Fixed Wavelength	The Fixed Wavelength mode collects data at up to 4 wavelengths. You can display the data in absorbance, transmittance, or concentration. The concentration is calculated by a user-defined factor or formula.
Wavelength Scan	The Scan Wavelength mode shows how a sample absorbs light over a range of wavelengths. You can use this feature to optimize instrument sensitivity with a given chemistry. The screen plots the scan.
Kinetics/Time	The Kinetics/Time Measurement mode records absorbance or % transmittance at a single wavelength over a specified time period.
Single Component Analysis (SCA)	The SCA mode lets you prepare a standard curve for analyzing samples that contain one component.
Protein Assay Analysis	The Protein Assay mode provides a simple procedure to calculate the amount of protein in a sample. It contains pre-selected parameters for seven common protein assay methods.

8.50 x 11.00 in
Done Unknown Zone

Spectrophotometry: DU730 Main Menu Options pg 2/2

Table 3.1 Main Menu Soft Key Options

Nucleic Acid Analysis	The Nucleic Acid mode provides ten methods for DNA, RNA, and oligonuceotide analyses, which calculates nucleic acid absorbance ratios and concentrations. Other calculations include molecular weight, nucleotide length, extinction coefficient, concentration, and melting temperature.
% Dye Incorporation	The % Dye Incorporation mode works for single- and duo-color methods (spotted array). This works for any dye that gives similar fluorescence wavelength to Cy3 (550nm) or Cy5 (650 nm).
DNA/Protein Tools	The DNA/Protein Tools mode does not take measurements. The mode provides a number of calculations, conversations, and tables to aid you in common daily tasks.
System Checks	The System Checks mode lets you check the performance of the instrument (photometric accuracy, photometric noise, stray light, wavelength accuracy, lamp history, and printer check).
Recall Data	The Recall Data mode lets you store, recall, send, and erase data from the Datalog.
Instrument Setup	The Instrument Setup mode allows you to configure the instrument and the module, based on your specific requirements.

Spectrophotometry: DU730, dsDNA, ssDNA, RNA, Options cont.

Address http://users.stlcc.edu/departments/fvbio/Spectrophotometer_DU700_Manual.pdf Go
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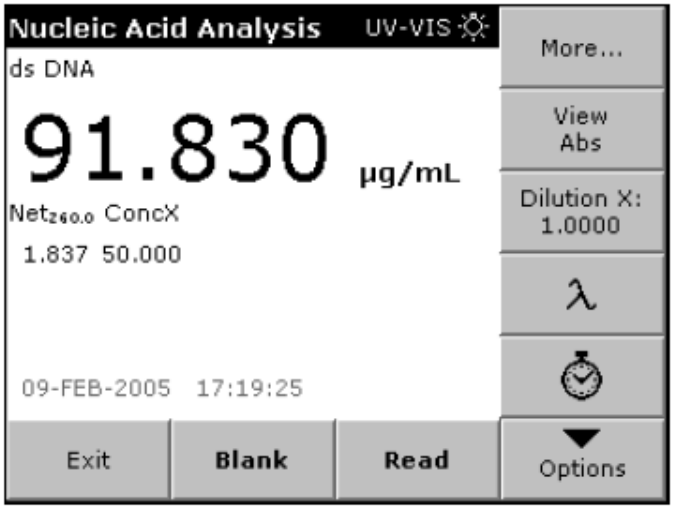
dsDNA, ssDNA, and RNA



Touch **Options** for the parameter setup.

- **More...:** displays further options in the Options screen.
- **View Conc/Abs**: lets you toggle between the screen that displays the result data (concentration) and the screen that shows the raw data (absorbance values).
- **Dilution X**: lets you enter a dilution correction factor. The displayed results are corrected for dilution using the following equation:

  Con_{corr} = Conc x Dilution.

- λ: lets you modify the default wavelengths and toggle background correction on and off. When background correction is on, you can modify the default background wavelength.
- **Timer Icon**: sets the timer. Using the timer does not affect the readings that the instrument is taking. The times are not stored with sample readings.

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Spectrophotometry DU 730: Print/Send data to USB devices, Sec 14.3

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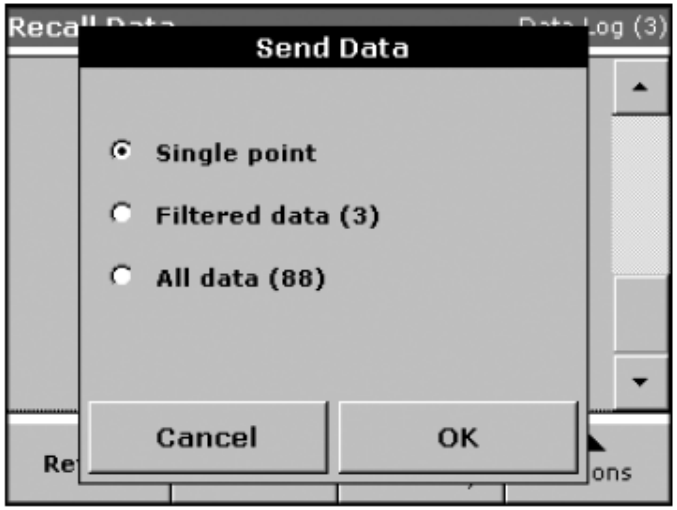

You can send data to a printer or a memory device using the available USB ports. Since the system automatically senses connected devices, it sends the data to all available devices.

To send data:

1. Touch the **Options** button.
2. Touch **Send Data** (USB Port icon). The Send Data screen displays, enabling you to send a single point (selected item), the filtered data, or all data to the desired destination(s) by touching the respective radio button.
3. Touch **OK** to send the data.

NOTE The number in brackets shows the total number of data assigned to this selection.

The instrument automatically sends the data as a single DATALOG file to the memory device using the CSV (Comma Separated Value) file format.

The file name uses the following format:
DL*Year_Month_Day_Hour_Minute_Second*.csv

NOTE CSV files are the preferred format for data import into spreadsheet

8.50 x 11.00 in
Done
Unknown Zone

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Spectrophotometry DU 730: Print/Send Scan or Recalled Data

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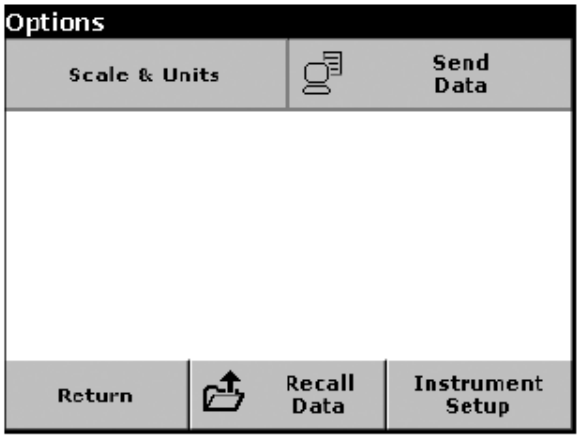
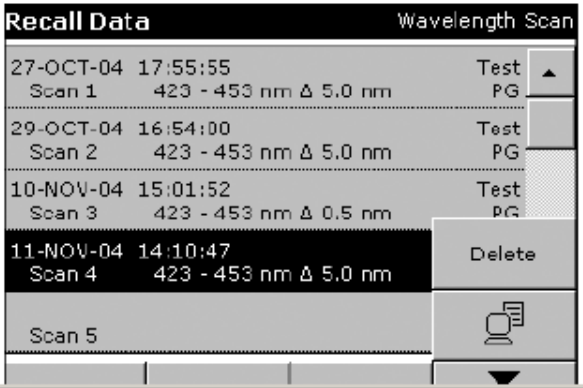


You can send scan data to a printer or a memory device using the available USB ports. Since the system automatically senses connected devices, it sends the data to all available devices.

To send scan data directly from the Wavelength Scan mode:

1. Touch **Options**.
2. Touch **More...**.
3. Touch **Send Data** (USB Port icon). The instrument immediately sends to the connected devices the data of all scans that currently reside in memory.


Recall Data
Wavelength Scan
27-OCT-04 17:55:55 Test
Scan 1 423 - 453 nm Δ 5.0 nm PG
29-OCT-04 16:54:00 Test
Scan 2 423 - 453 nm Δ 5.0 nm PG
10-NOV-04 15:01:52 Test
Scan 3 423 - 453 nm Δ 0.5 nm PG
11-NOV-04 14:10:47
Scan 4 423 - 453 nm Δ 5.0 nm
Delete
Scan 5

To send scan data from the Recall Data screen:

1. Highlight the line with the desired scan #.
2. Touch **Options**.
3. Touch **Send Data** (USB Port icon). The instrument immediately sends to the connected devices the data of the selected scan.

NOTE You may repeat this procedure for the remaining scan data you want to send to the target location(s).

Done Unknown Zone

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Spectrophotometry: DU 730 Excel Import CSV File (ex)

Parameter:	**Date:**	**Operator ID:**	**Sample ID:**	**Sample Number**	**Result 1**	**Unit 1**	**Name 1**	**Result 2**	**Unit 2**
	Name 2	**Wavelength 1**	**Value**	**Unit**	**Wavelength 2**	**Value**	**Unit**		
260/280 Ratio	10/9/2008 9:37		EILENE		1.125	Ratio		0.07	µg/mL
		260	0.072	Abs	280	0.064	Abs		
260/280 Ratio	10/9/2008 9:37		EILENE		1.125	Ratio		0.07	µg/mL
		260	0.071	Abs	280	0.063	Abs		
260/280 Ratio	10/9/2008 9:37		EILENE		1.122	Ratio		0.07	µg/mL
		260	0.071	Abs	280	0.063	Abs		
260/280 Ratio	10/9/2008 9:38		BOB		1.127	Ratio		0.06	µg/mL
		260	0.064	Abs	280	0.057	Abs		
260/280 Ratio	10/9/2008 9:38		BOB		1.135	Ratio		0.06	µg/mL
		260	0.064	Abs	280	0.056	Abs		
260/280 Ratio	10/9/2008 9:38		BOB		1.129	Ratio		0.06	µg/mL
		260	0.063	Abs	280	0.056	Abs		
260/280 Ratio	10/9/2008 9:39		BECKY		1.052	Ratio		-0.02	µg/mL
		260	-0.016	Abs	280	-0.016	Abs		
260/280 Ratio	10/9/2008 9:39		BECKY		1.08	Ratio		-0.02	µg/mL
		260	-0.017	Abs	280	-0.015	Abs		
260/280 Ratio	10/9/2008 9:39		BECKY		1.07	Ratio		-0.02	µg/mL
		260	-0.016	Abs	280	-0.015	Abs		
Parameter:	**Date:**	**Operator ID:**	**Sample ID:**	**Sample Number**	**Result 1**	**Unit 1**	**Name 1**	**Result 2**	**Unit 2**
	Name 2	**ConcX**	**Wavelength 1**	**Value**	**Unit**	**Wavelength 2**	**Value**		
ds DNA	10/9/2008 9:40		BECKY		1.138	Ratio		3.324	µg/mL
		50	260	0.066	Abs	280	0.058		
ds DNA	10/9/2008 9:40		BECKY		1.132	Ratio		3.294	µg/mL
		50	260	0.066	Abs	280	0.058		
ds DNA	10/9/2008 9:40		BECKY		1.136	Ratio		3.286	µg/mL
		50	260	0.066	Abs	280	0.058		

Spectrophotometer; Beckman DU 530UV, Description

- Cell Module with 1 cm Cell Holder
- Graphical Liquid Crystal Display
- Keyboard and Alphanumeric Pad
- 100 User Programs
- Methods and Data Storage
- Instrument Diagnostics
- Serial Interface (RS-232)
- Parallel Printer Port
- Multi-Language Software
- Fixed Wavelength Mode
- Scanning Mode
- Time-Based Kinetics
- Single Component Analysis
- Protein Analysis
- Nucleic Acid Analysis
- Performance Validation Software

Spectrophotometer;Themo-Sci, Genesys 10S-UV-Vis, @BRDG

1. On/Off toggle, lower rear at power line

2. Basic ATC (select TEST button)
3. To Change parameters, select Utility button

Research Quality with Routine Simplicity

- Accelerate through wavelength scans with scan speeds up to 3,600nm/minute
- Depend on dual-beam optics for superior photometric accuracy
- Acquire data from the UV to the near-IR
- Small footprint for easy transport and storage
- Increase sample throughput with the integrated 6-cell changer
- Thermostatting options with both circulating water and Peltier cooling
- Measure unusual or challenging samples with a variety of optional holders for test-tubes, long path cuvettes and filters
- Add a sipper accessory for easy sample handling

Maintenance-Free Lamp

- Save time with the instant-on xenon flash lamp
- Perform accurate analysis over the entire wavelength range of 190-1100nm
- Prevent damage to sensitive samples as the lamp only flashes when data is being acquired
- Save money with long-lifetime xenon flash lamp (guaranteed for 3 years)
- Lamp produces almost no heat so sample compartment temperature remains stable
- - See more at: http://www.thermoscientific.com/content/tfs/en/product/genesys-10s-uv-vis-spectrophotometer.html#sthash.MyLKfIhY.dpuf

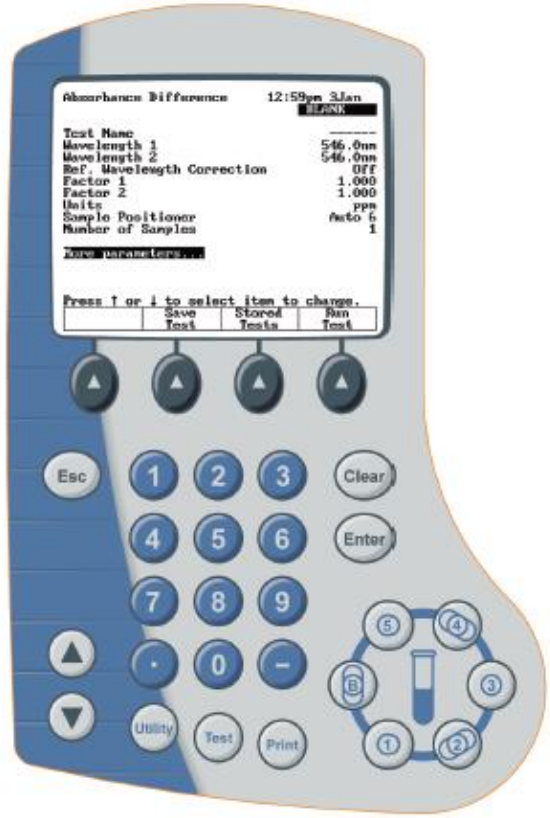
Link to Thermo-Sci, Genesys, 10S-UV-Vis Users Guide ..(pdf)

Spectrophotometer;Themo-Sci, Genesys 10S-UV-Vis, @BRDG

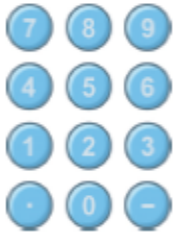
GENESYS 10S Series Specifications

	GENESYS 10S UV-Vis	GENESYS 10S Vis
Optical Design	Dual-Beam – Internal Reference Detector	Single-Beam
Spectral Bandwidth	1.8 nm	5.0 nm
Light Source (Typical Lifetime)	Xenon Flash Lamp (5 years, 3 years guaranteed)	Tungsten-Halogen Lamp (1000 hrs.)
Detectors	Dual Silicon Photodiodes	Silicon Photodiode
Wavelength		
Range	190–1100 nm	325–1100 nm
Accuracy	±1.0 nm	
Repeatability	±0.5 nm	
Slew Speed	11,000 nm/min	
Scan Speed	Up to 3600 nm/min	
Data Interval for Scanning	0.1, 0.2, 0.5, 1.0, 2.0, 5.0 nm	1.0, 2.0, 3.0, 5.0 nm
Photometric		
Linear Range	Up to 3.5 A at 260 nm	Up to 3.0 A at 340 nm
Display	-0.1 A; -1.5–125%T; ±9999 C	-0.1–3.0 A; -0.3–125%T; ±9999 C
Accuracy	±0.005 A at 1.0 A 0.010 A $K_2Cr_2O_7$	0.5% or ±0.005 A, whichever is greater up to 2 A
Noise	<0.00025 at 0.0 A; <0.00050 at 1.0 A; <0.00080 at 2.0 A; RMS at 260 nm	<0.001 A at 0.0 A <0.002 A at 2.0 A Peak-to-peak at 340 nm
Drift	<0.0005 A/hr	0.002 A/hr after warm-up
Stray Light	<0.08%T at 220, 340 nm (NaI, $NaNO_2$); <1.0%T 198–200 nm (KCl)	<0.1%T at 340, and 400 nm
Display	Graphical with LCD backlight; 9.7 × 7.1 cm (3.8 × 2.8 in)	
Keypad	Sealed Membrane with tactile response keys	
Printer (optional)	40 column Internal (text and graphics); External USB printer (HP PCL 3.0 and greater)	
Connectivity	USB Type A port for USB memory device (front panel) USB Type B port for optional computer connectivity (rear panel) USB Type A port for external printer (rear panel)	
Dimensions	30 W × 40 D × 25 H cm (11.8 × 15.7 × 9.8 in)	
Weight	8.6 kg (19 lbs)	
Power Requirements	Selected Automatically 100–240 V; 50–60 Hz	

Spectrophotometer;Genesys, Keypad



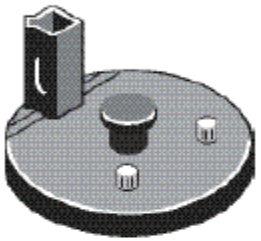
Key or button	Function
Function keys	• Called "Function" keys. • Performs a specific function as displayed above each key. • Functions will change depending on the software screen. • Some function keys may not be active.
	• Clears the value being entered. • Returns to the previous screen.
	• Deletes the last character entered.

Key or button	Function
	• Accepts highlighted, entered, or selected values. • Advances to the next parameter or screen.
	• Prints the method or results to the selected printer. • If "PC" is selected for the printer, sends the method or results to the USB port.
	• Displays a menu of software applications.
	• Displays the Utility screen.
	• Controls the location of the cursor • Highlights the value or option for the selection.
	• Enters numbers, a decimal point and a minus sign for values.
	• Cell position keys. • Selects the cell holder position to be measured. • B = blank and 1-5 = sample positions. • = positions when used in Auto 3 mode.

Spectrophotometer:Genesys. Cell Holders. Cuvettes

6-Position Cell Holder

Single Cell Holder



Note If the Cell Positioner method option is set to Auto 6, whenever you press **Run Test** to start a measurement, the instrument attempts to initialize the cell positioner. If a single cell holder is installed, the message "Error, Single Cell Holder found. Use Single Cell Holder?" appears. Press **Accept Change** to continue the measurement with a single cell, or install the 6-cell changer and press **Cancel Change**.

See the parts list for a more detailed list of available accessories.

Selecting and Positioning Cuvettes

The compatible wavelength range for different types of cells depends on the material used.

Cell Type	Wavelength
Optical Glass	360 nm to > 1100 nm
Borosilicate Glass	330 nm to > 1100 nm
Disposable:	
Quartz	190 nm to > 1100 nm
Polystyrene	> 340 nm
Methacrylate	> 300 nm
Acrylic	> 280 nm
UV-transparent	> 220 nm

Spectrophotometer; Genesys, Measurement Options

Auto 6

Measure one blank and up to five samples without changing cuvettes in the cell changer. The instrument automatically measures the blank and advances the cell changer to measure the remaining samples.

Auto 3

Measure one blank and two samples without changing cuvettes in the cell changer. The instrument automatically measures the blank and advances the cell changer to measure the samples in positions 2 and 4.

Single Cell Holder

Place the blank in the cell holder, measure it, place a sample in the cell holder, and then measure your sample. This process is completely manual. The cell position buttons do not function when you select Single Cell Holder.

Note You can cause the 6-Cell Changer to function as a single cell holder and measure only one cell by selecting this option. However, we recommend that the single cell holder be used for accessories requiring a high degree of positioning repeatability, such as the nanoCell accessory, small aperture microcells, the coupling module of fiber optics probes, and flowcells used with a sipper system.

Manual 6

Measure a blank and up to five samples without changing cuvettes in the cell changer, using the cell position buttons to advance the cell changer to the appropriate position for the next measurement. Place the blank in the blank position and your samples in the other cell positions. Regardless of where the cell holder is positioned, when you press **Measure Blank** the cell holder automatically goes to the blank position and measures the blank. However, you can use the cell position buttons to select a different position for the measurement.

Note When you have the Cell Changer installed, the instrument always considers the material in the B position as a blank. This means that even after measuring your blank the first time, you can place samples only in positions 1 through 5.

Spectrophotometer; Genesys, Basic ATC Mode

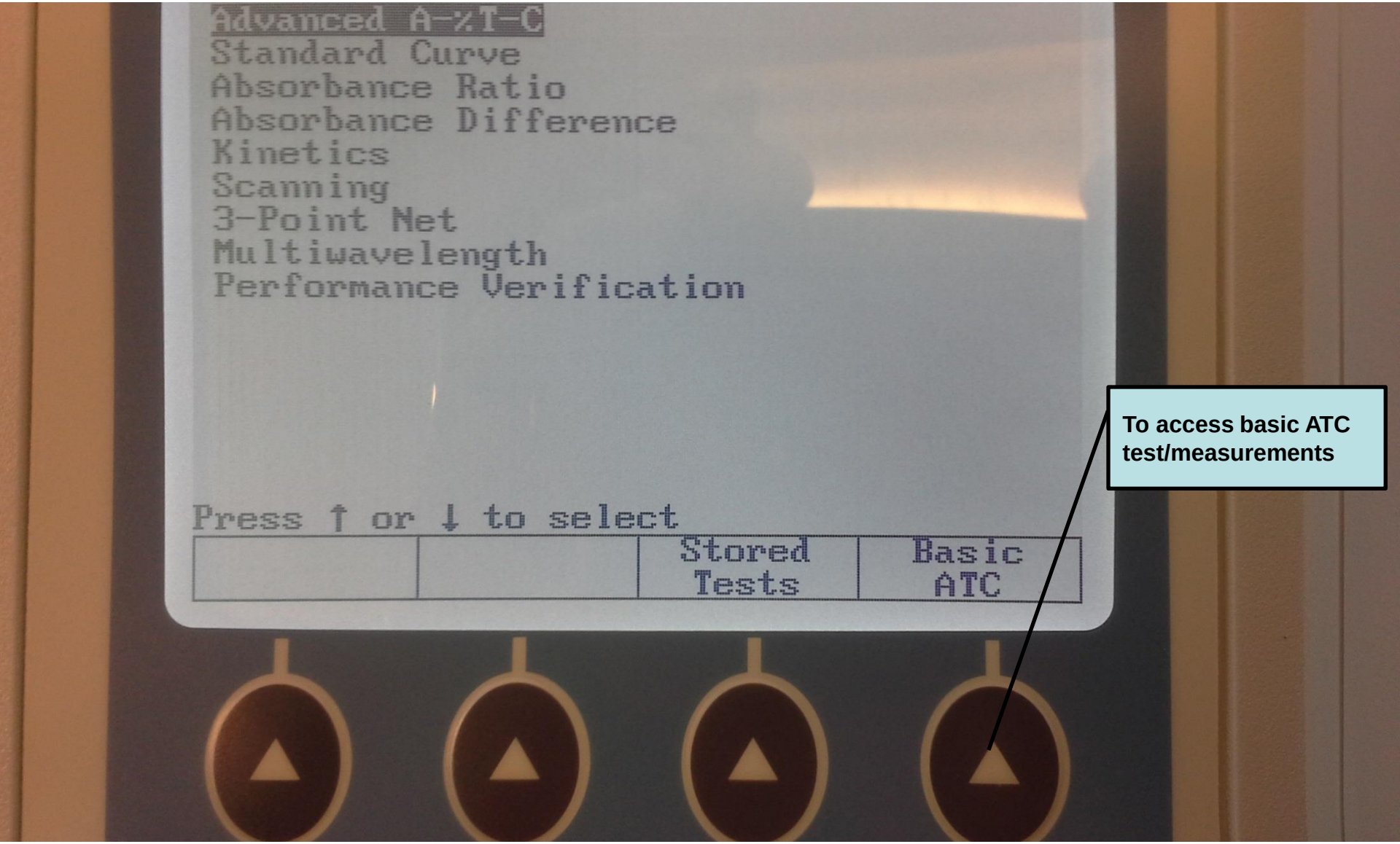
Basic ATC mode puts the instrument into an "instant measurement" mode. The user simply walks up to the instrument, inserts a sample and measures it. Depending on whether the mode is set to Absorbance (A), % Transmittance (%T), or Concentration, the result appears, along with the type of measurement, the date and time, the wavelength and the cell position used for the measurement.

To toggle between Absorbance, %Transmittance, and Concentration, press **Change Mode**. You can toggle modes whenever you see Change Mode.

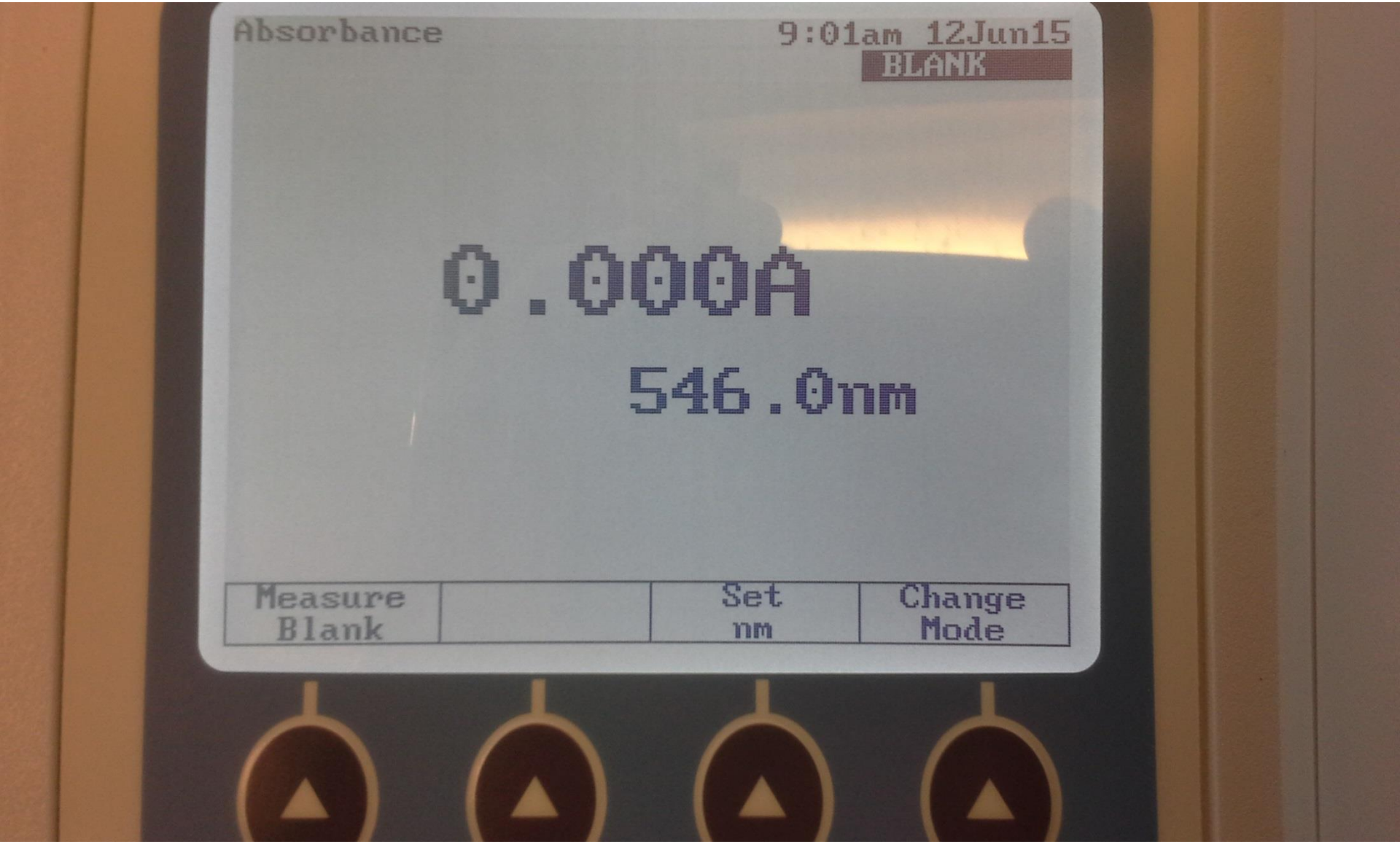
When Basic ATC is set to Absorbance or % Transmittance, these capabilities are provided:

- Setting the Wavelength
- Measuring a Blank
- Measuring Samples

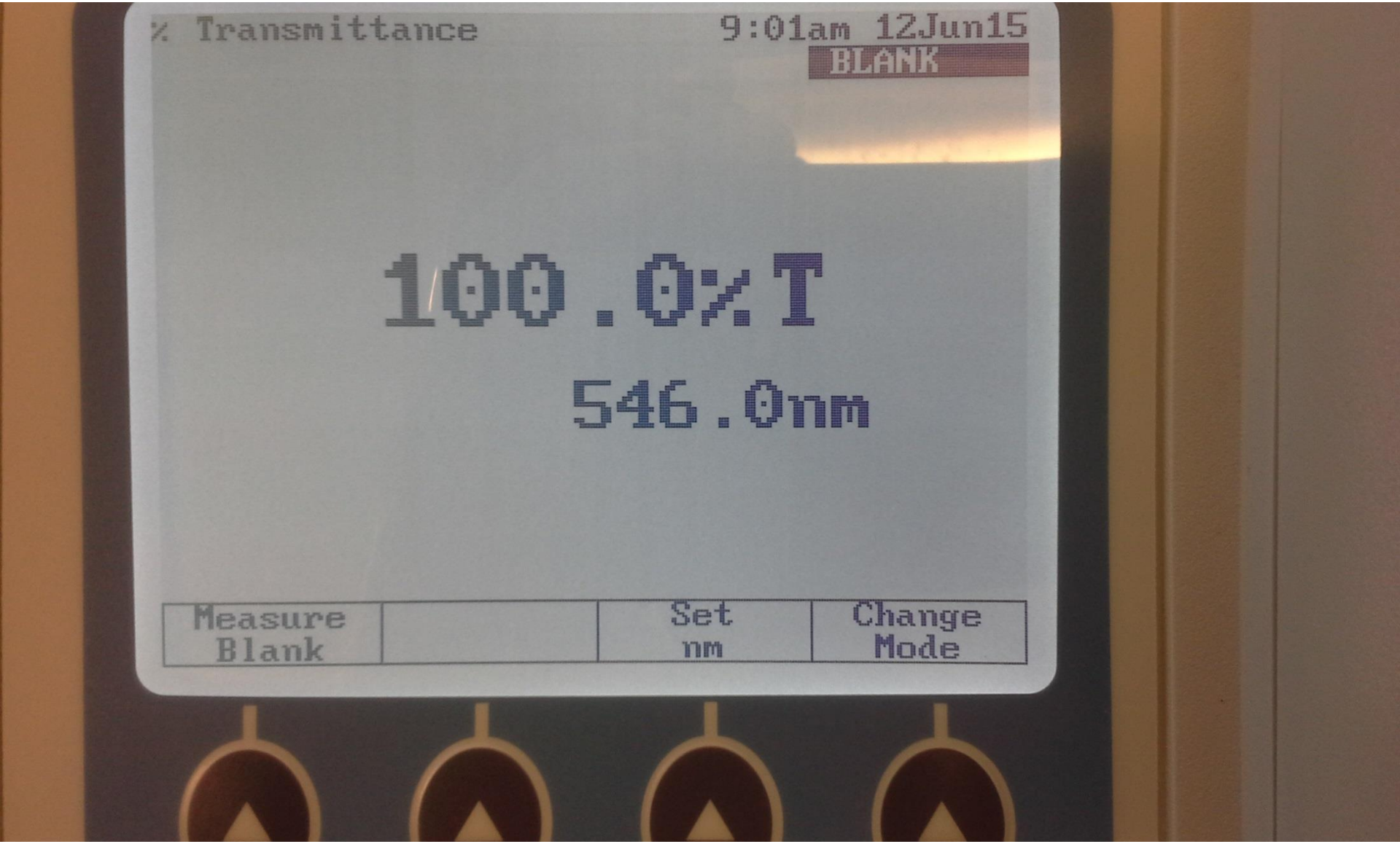
Spectrophotometer: Genesys, Select Basic ATC button



Spectrophotometer;Genesys; Basic ATC, Absorbance



Spectrophotometer;Genesys, Basic ATC, Transmittance



Spectrophotometer; Genesys, Basic ATC, Concentration

Spectrophotometer; Genesys, Set Wavelength, Measure Blank

Set Wavelength

Press **Set nm** or any number key to set the wavelength.

2. Enter the wavelength for taking measurements and press **Set nm** again.

Measure Blank

❖ To measure a blank

1. Place the blank in the cell holder.

   If a 6-Position Cell Changer is installed, place the blank in the B position.

2. To enter an absorbance or transmittance value for the blank, press a number key and enter the desired value in the **Entry** field.

3. Press **Measure Blank**.

Spectrophotometer;Genesys, Measuring Samples

If a 6-Position Cell Changer is installed, place the samples in the cell positions and press the corresponding cell position button to move the cell holder to the measuring position. The absorbance (ABS) or percent transmittance (%T) measurement appears on the display.

If a Single Cell Holder is installed, remove the blank and place the sample in the cell holder. The absorbance or %Transmittance measurement appears on the display.

Spectrophotometer: Genesys, SmartStart Setup

The SmartStart™ feature lets you customize the spectrophotometer by placing the most frequently used test methods on the first menu. Right after the instrument initializes, a simple menu containing only the SmartStart tests appears.

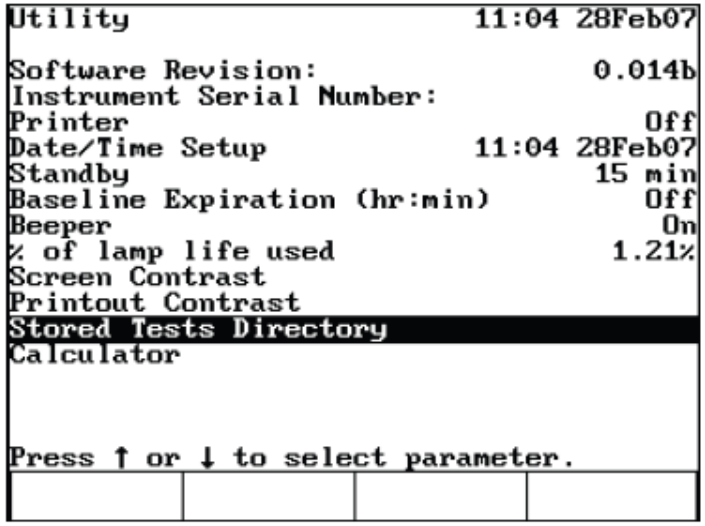
If you select one test as a SmartStart test, the instrument, when powered on, automatically loads this test and prepares for immediate measurement.

If you select more than one test as SmartStart tests, the instrument, when powered on, automatically displays a menu containing only those tests.

Note You can always access the default main menu by pressing **Test**.

❖ To set up a single test SmartStart

1. Press **Utility** to display the Utility screen.



2. Highlight **Stored Tests Directory** and press **Enter**.
3. Highlight the appropriate test and press **Select Test**.

   An arrow sign ">" indicates the test has been selected for the SmartStart menu.

   Press **Esc** to return to the Utility screen, or power down the instrument.

❖ To unselect a test

1. Press **Utility**.
2. Highlight **Stored Tests Directory** and press **Enter**.
3. Highlight the test to be removed and press **Unselect Test**.

   The Main Menu will be displayed upon power up.

❖ To set up a multiple test SmartStart

1. Follow steps 1 through 3 in the procedure above for setting up a single test SmartStart.
2. Select the desired tests.

   An arrow sign ">" indicates the tests selected for the SmartStart menu.

   Press **Esc** to return to the Utility screen, or power down the instrument.

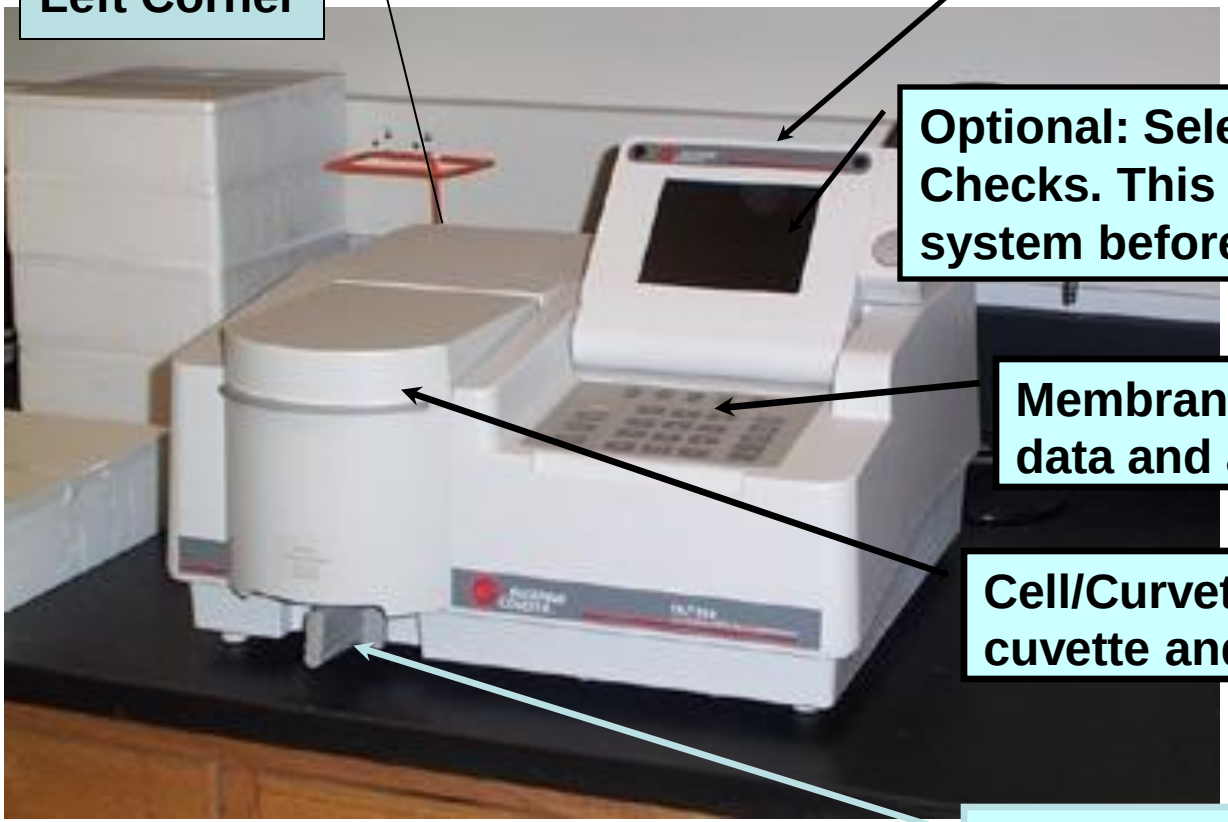
Note To remove tests from the SmartStart menu, see the procedure above for unselecting a test.

Spectrophotometer: DU 530 General Instructions

1. Swing open the flip-top screen
2. Turn on the device, lower left rear cradle switch
3. Observe Basic System Checks, pass or fail, on the screen
4. Prepare Blank/Buffer and Sample, careful not to touch the clear sides of the cuvettes. Label the stopper for each S (sample) or B (blank)
5. Use the arrow "^" keypad below the screen displays to select the Assay and/or to set other options and values.
6. **UV Lamp Warm Up REQUIRED**
   - **Select Nucleic Acid, then Select Assay 1 260/280 Ratio**
   - **Observe UV-VIS box in upper right. The "UV" will blink until the lamp is warmed up and ready for Blank and Sample reading.**
   - **The warm-up time can be from 2-10 minutes. Do not proceed until the "UV" display has stopped blinking.**
7. **The light source is from left-to-right, be sure that the cuvette is placed in the holder/cell aligned in this manner.**
8. Ensure that the lid is totally closed after inserting/removing cuvettes, stray light can void results.

Link to Beckman DU 700 series Spectrophotometer User Manual (pdf)

Spectrophotometer: DU 530 Main Menu; Optional System Checks



On/Off Rear Bottom Left Corner

Controller Menu (Flip up screen) Use keypad below for options

Optional: Select More, then System Checks. This can be used to self-test the system before running Samples.

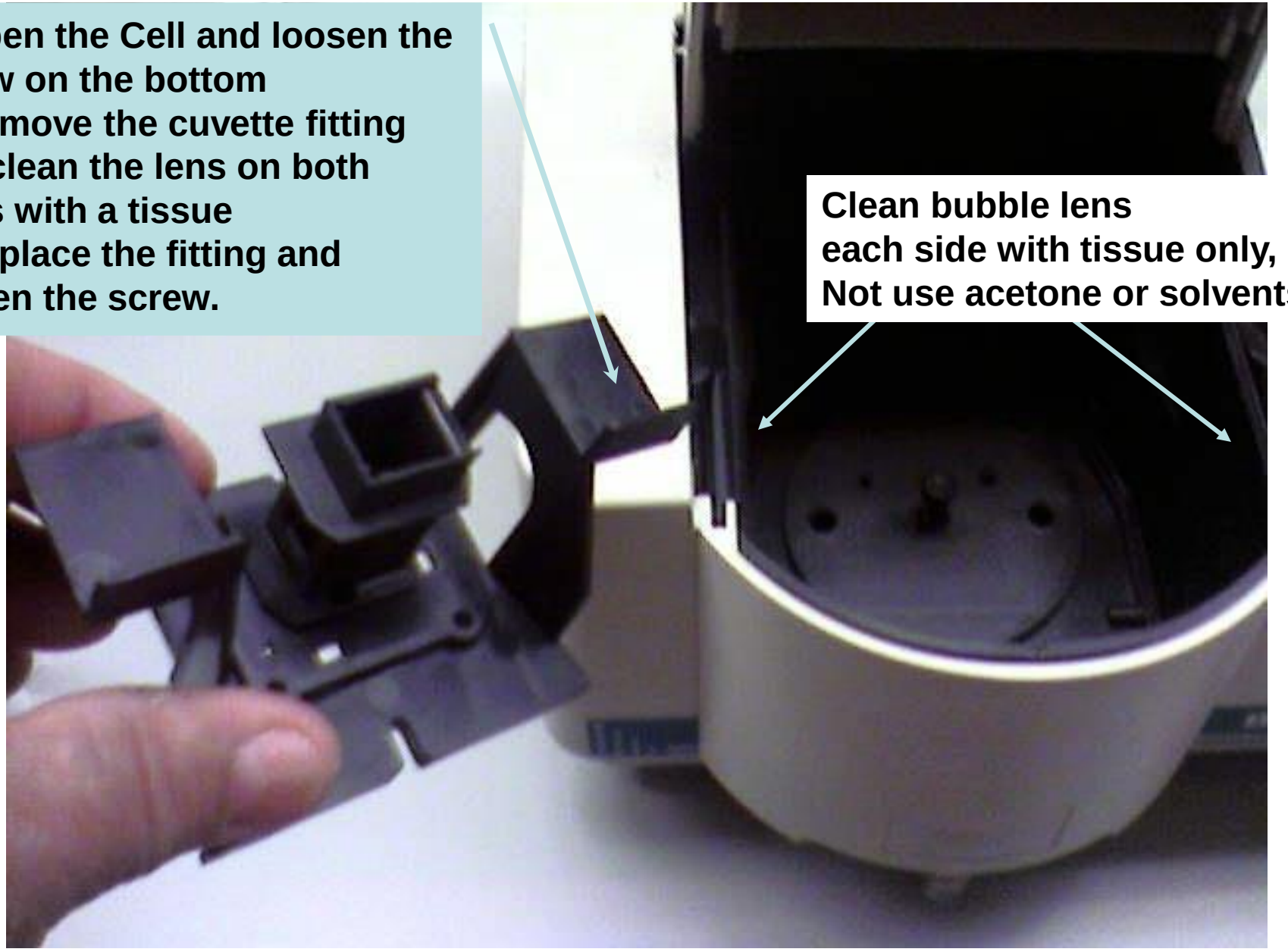
Membrane Keyboard: Used to enter data and activate displayed items.

Cell/Curvett Lid: Swing up to access cuvette and/or cell holder fitting

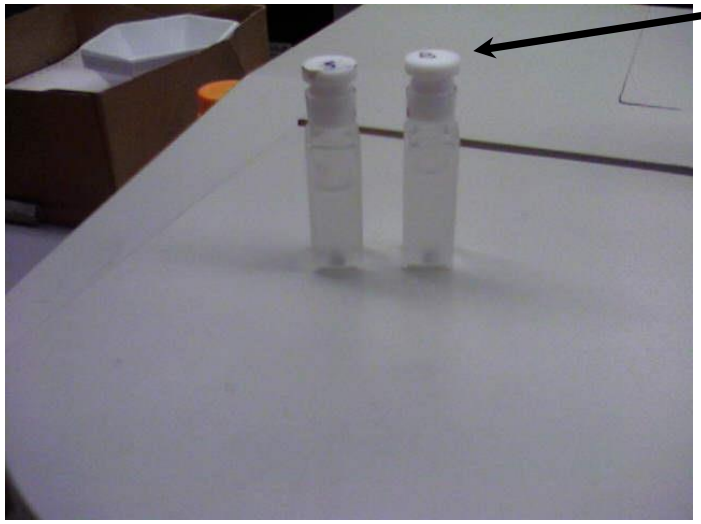
Remove/Load cuvette or carousel holding cell : CCW to 9am position to remove, CW to 12pm to lock in place

Spectrophotometer: DU 530 Setup; Cleaning Lens

1. Open the Cell and loosen the screw on the bottom
2. Remove the cuvette fitting and clean the lens on both sides with a tissue
3. Replace the fitting and tighten the screw.

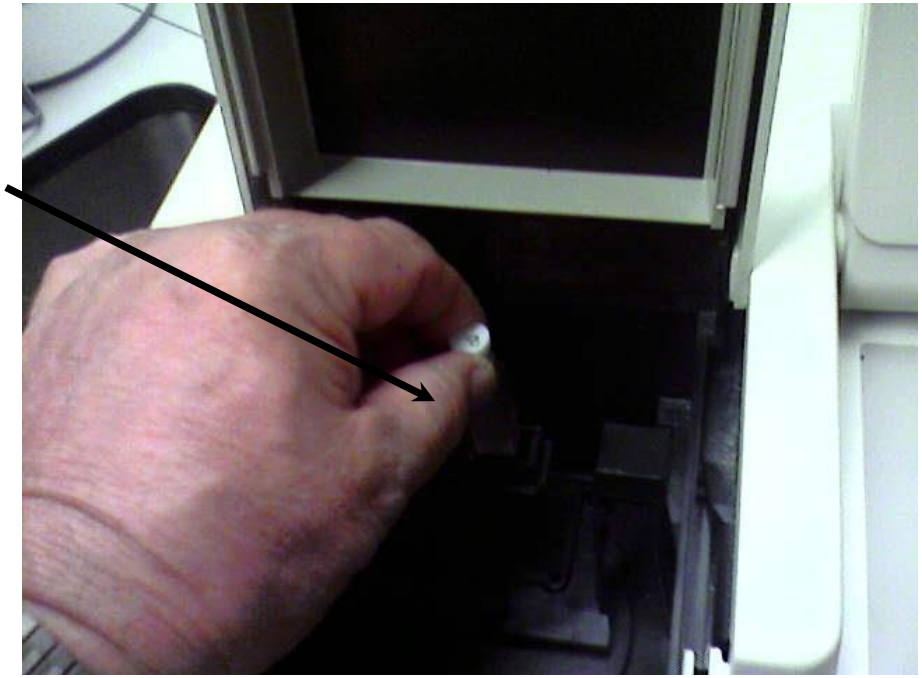


Spectrophotometer DU 530 Setup; cuvette Handling



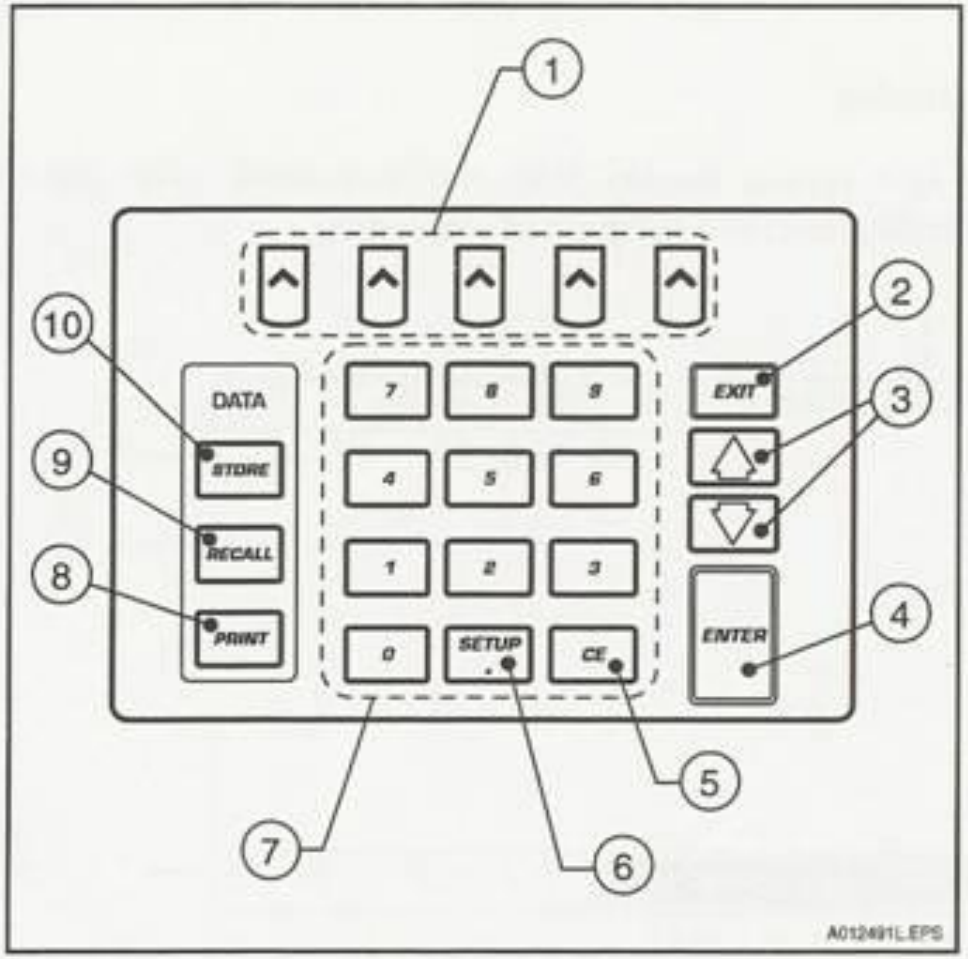
1. When handling the cuvettes for the Blank/Buffer and the Sample, avoid any contact with the clear sides of the cuvette. Handle it only by the opaque sides.
2. Label the white stopper on the cuvettes, B= blank/buffer, S= sample

3. Wipe the clear sides of the cuvette with lab tissue before inserting it into the holder, opaque sides toward the front and rear.
4. Clean cuvettes after use with soap and water, rinse with deionized water before use



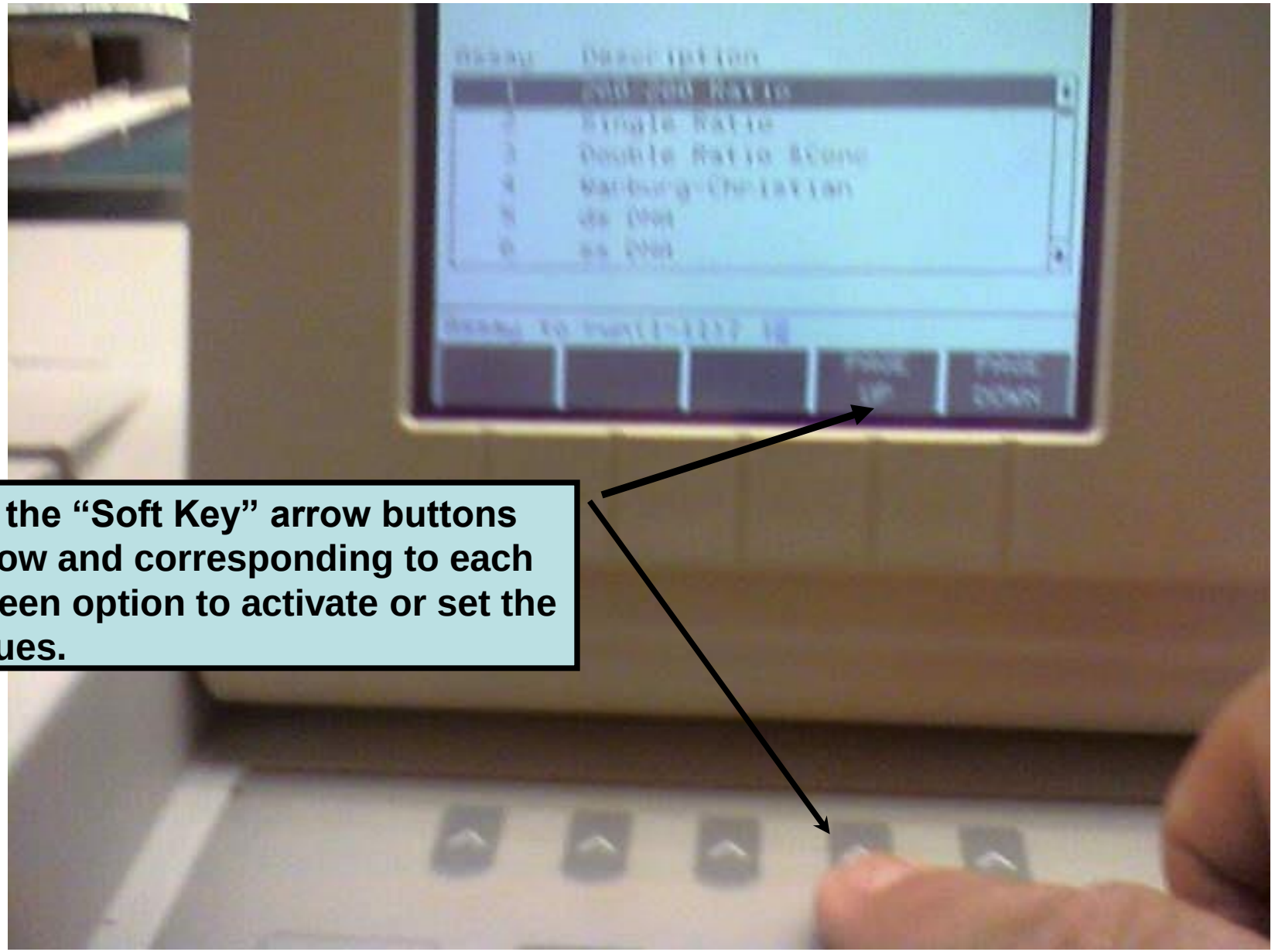
Spectrophotometer; DU 530 Membrane Keyboard Description

3.2 Keyboard Description



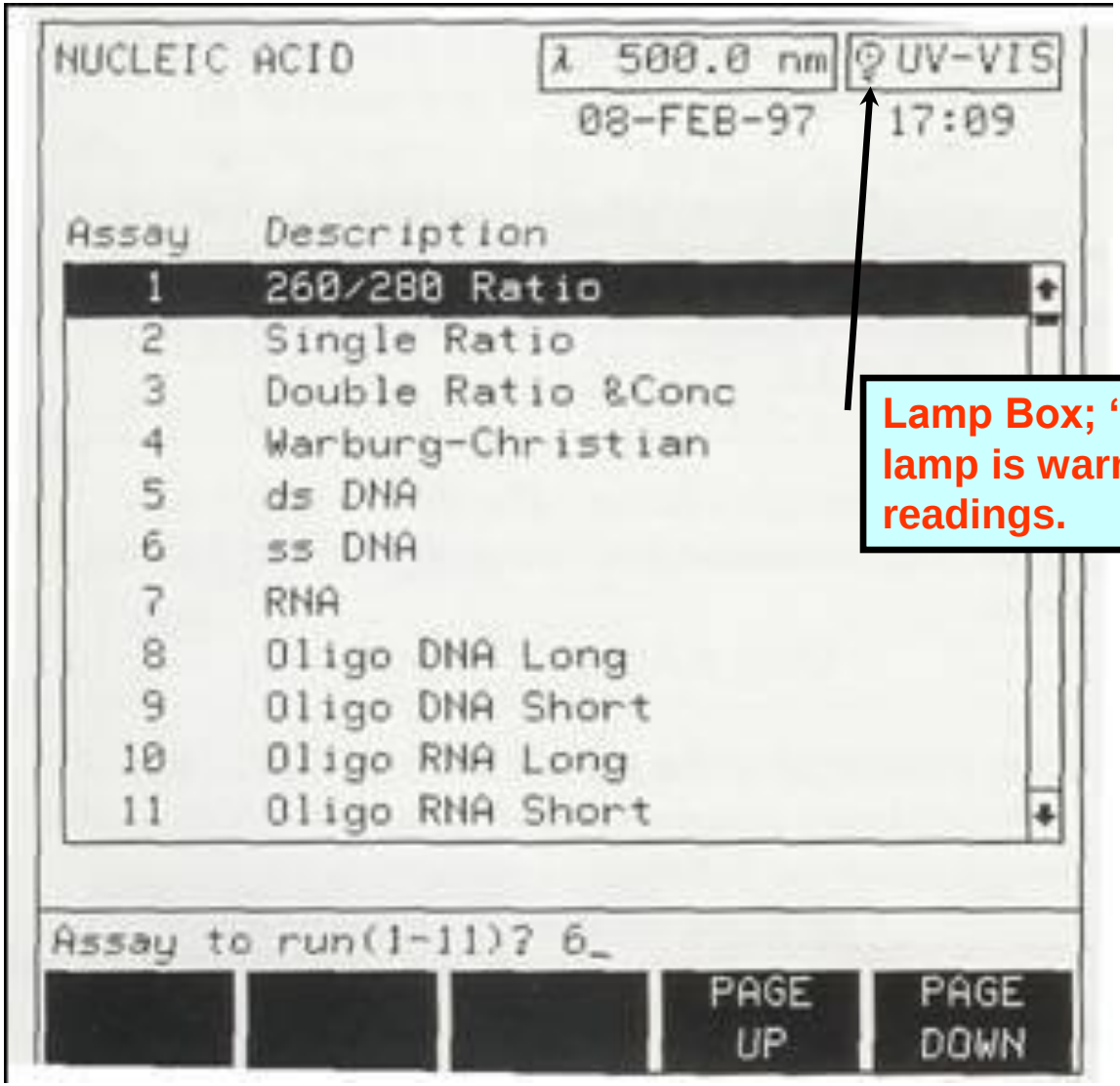
1. Soft Keys
2. Exit
3. Scroll Keys
4. Enter Data
5. Clear Entry
6. Decimal Point and Instrument Setup
7. Numeric Pad
8. Printing or Download Display
9. Data Recall
10. Data Storage

Spectrophotometer; DU 530 Selecting Options or Setting Values



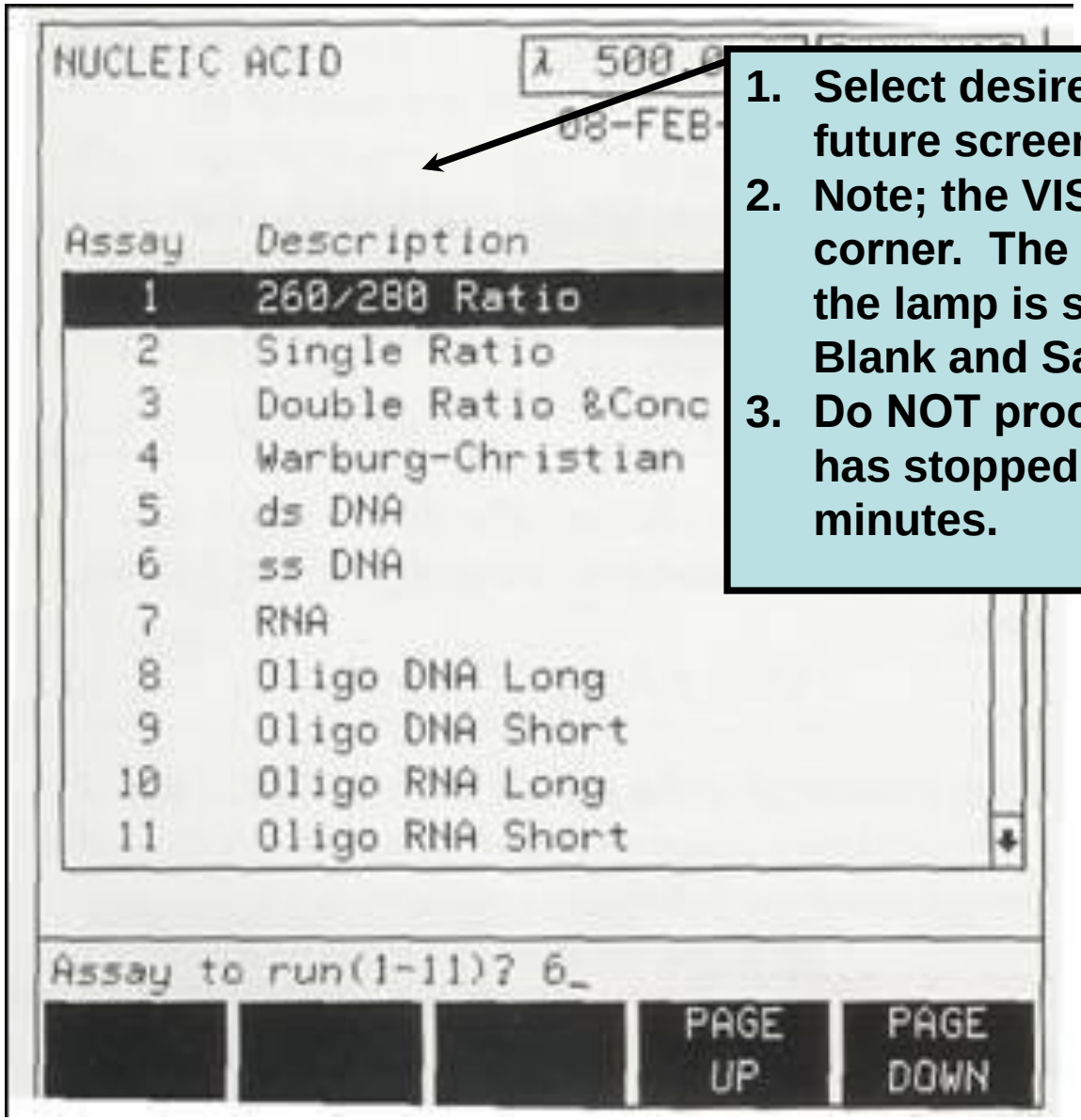
Select the “Soft Key” arrow buttons below and corresponding to each screen option to activate or set the values.

Spectrophotometer; DU 530 Main-Nucleic Acid –Parameters screen



Lamp Box; "UV" will be blinking until the lamp is warmed up for blank and sample readings.

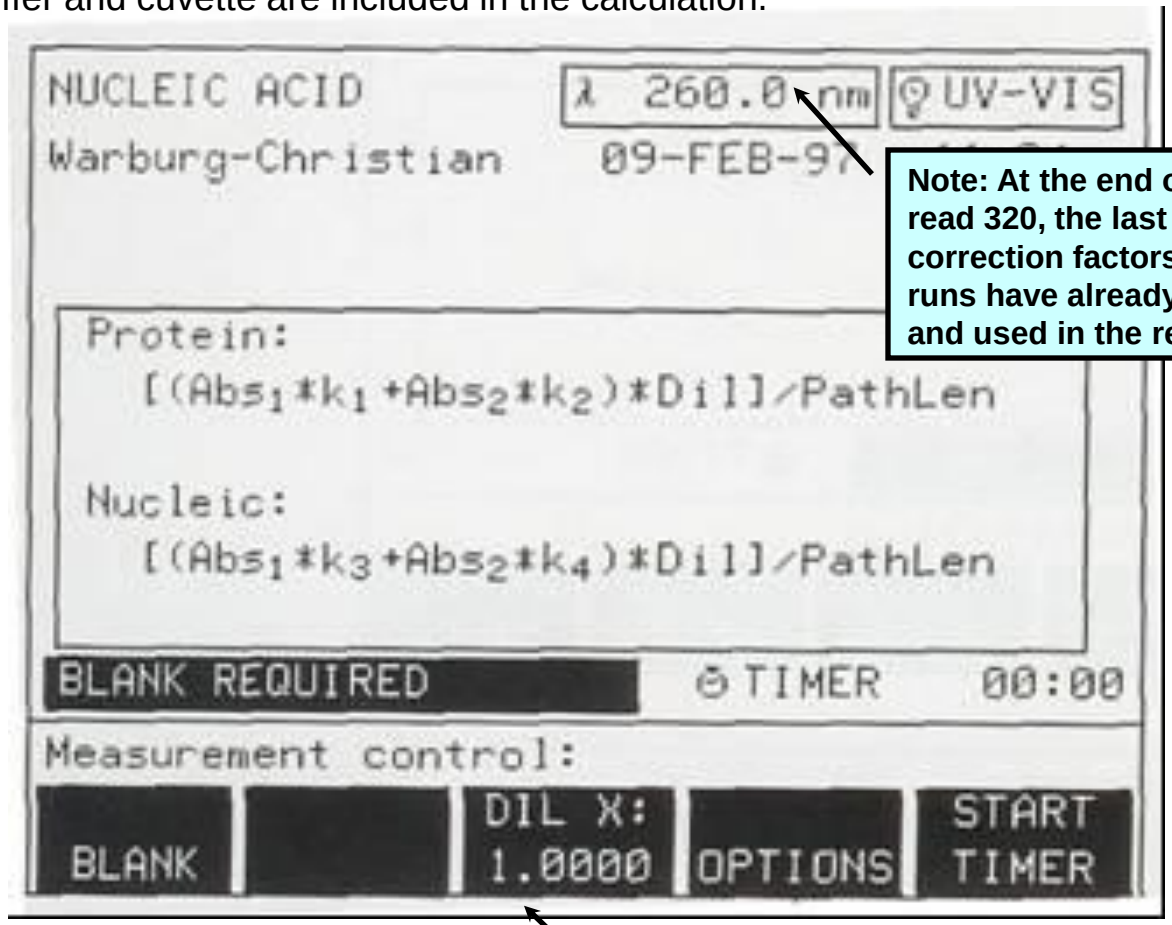
Spectrophotometer; DU 530 Recommended Warm-up and Blank Testing



1. **Select desired Assay type and follow future screen instructions.**
2. **Note; the VIS box in the upper right corner. The "UV" section will blink until the lamp is sufficiently warmed up for Blank and Sample readings.**
3. **Do NOT proceed until the "UV" blinking has stopped. This could take 2-10 minutes.**

Spectrophotometer; DU 530 Main-Nucleic Acid- Warburg-Christian

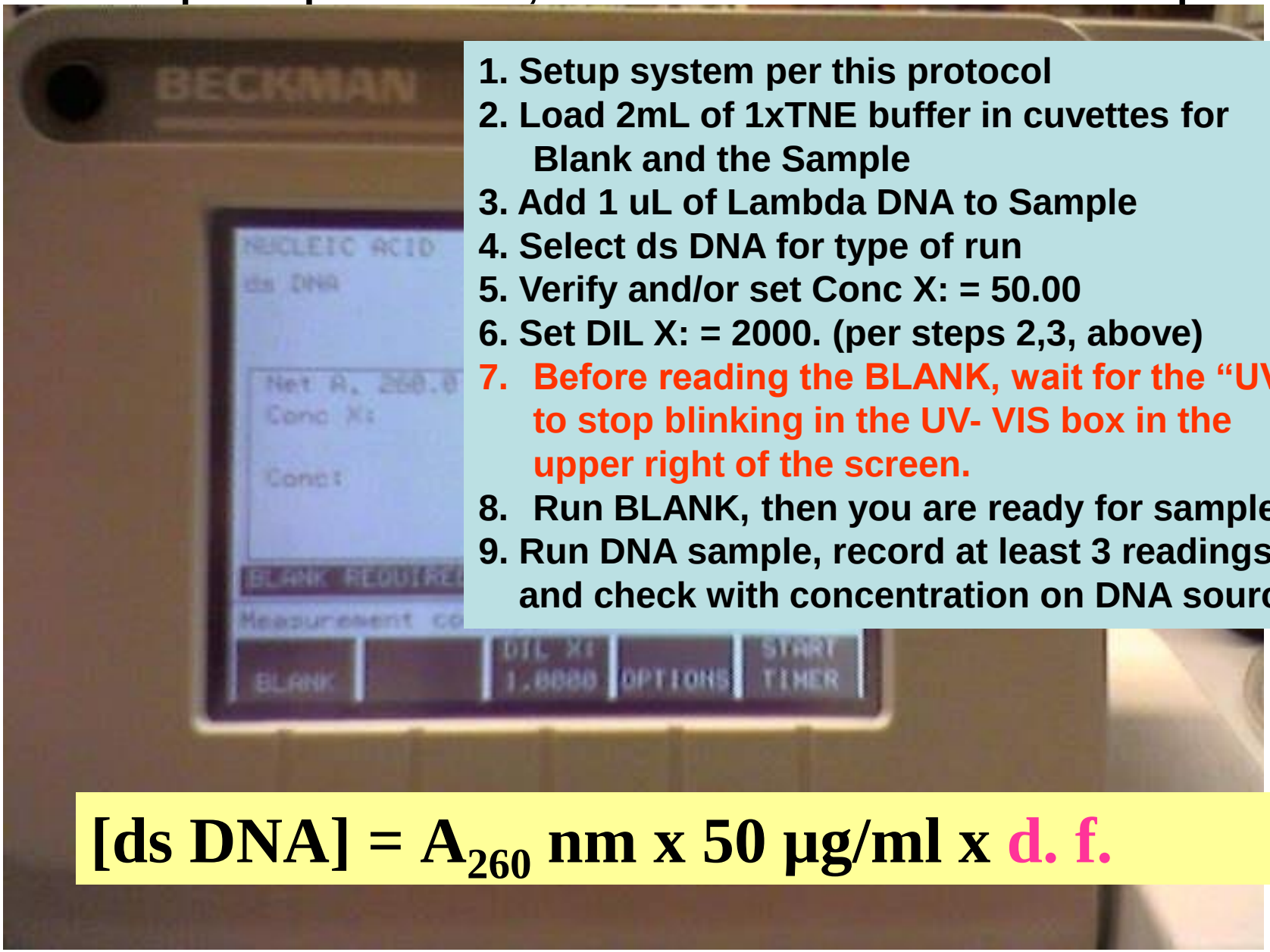
Assay #4, <u>The Warburg-Christian method is designed to give the most accurate calculation of DNA concentration.</u> The calculations are performed by the spec using λ 260.0 nm and constants calculated by Warburg and Christian. A reading at λ 320 is also automatically performed and any correction for background absorbance by the buffer and cuvette are included in the calculation.



Note: At the end of the WC run, this will read 320, the last wavelength run for the correction factors. The 260 and 280 runs have already been made/stored and used in the results.

Note:Press the soft key below DIL X: 1.0000. Type in the dilution factor of the DNA in the 1X TNE buffer (ex: 1µL DNA to 2 mL 1X TNE, type in 2000. Press ENTER.

Spectrophotometer; DU 530 Lambda DNA Test Example



1. Setup system per this protocol
2. Load 2mL of 1xTNE buffer in cuvettes for Blank and the Sample
3. Add 1 uL of Lambda DNA to Sample
4. Select ds DNA for type of run
5. Verify and/or set Conc X: = 50.00
6. Set DIL X: = 2000. (per steps 2,3, above)
7. Before reading the BLANK, wait for the "UV" to stop blinking in the UV- VIS box in the upper right of the screen.
8. Run BLANK, then you are ready for samples
9. Run DNA sample, record at least 3 readings and check with concentration on DNA source

[ds DNA] = A_{260} nm x 50 µg/ml x d. f.

Spectrophotometry; DU 530 Lamps and other Maintenance Issues

Access to Lamps and Mirrors for replacement and cleaning.

1. Push in both sides of the small door in the upper part of the back panel.
2. Swing up and remove the door.
3. Loosen (ccw) the two screws holding the lamp cover plate and remove the plate.
4. Carefully clean circular mirror, it is free to rotate, not fixed.
5. DO NOT touch the lamps with bare fingers. Use a cloth or lab wipe.

Remove/Load cuvette or carousel holding cell : CCW to 9am position to remove, CW to 12pm to lock in place

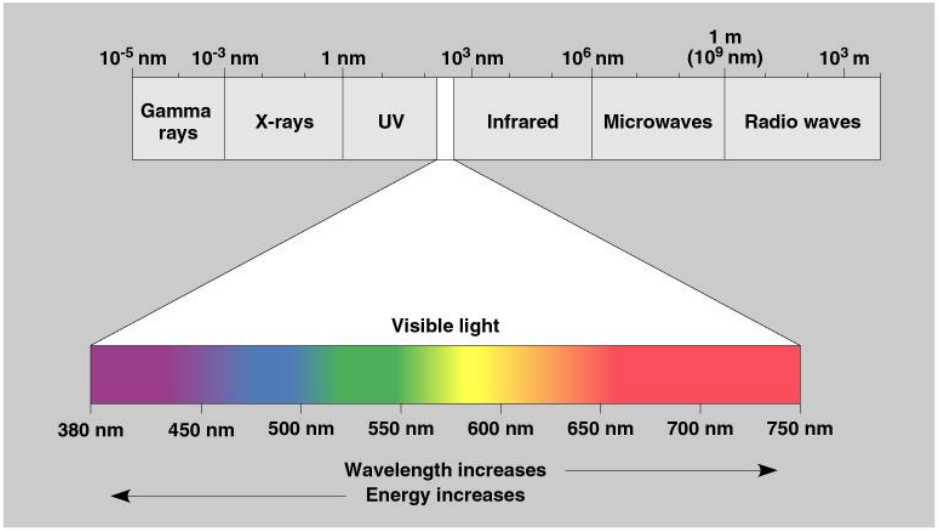
Spectrophotometry: DU 530 Lab-Assays #1 and #4

Sample	wavelength (nm)	[µg/mL] Reading 1	[µg/mL] Reading 2	[µg/mL] Reading 3	Average
1x TNE buffer	325				
DNA Sample 1	260				
DNA Sample 2	260				
DNA Sample 3	260				
		Ratio 1	**Ratio 2**	**Ratio 3**	**Average**
DNA Sample 1	260/280				
DNA Sample 2	260/280				
DNA Sample 3	260/280				

The Assay #4 Warburg-Christian results are entered in this area of your lab worksheet. Unless the Dilution Factor was set on the Spectrophotometer, this must be calculated here.

The Assay #1, 260/280 ratio results are entered here. Take 3 Readings.

Spectrophotometer ; DU 530 Verify Quality and Quantity with the UV



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- DNA absorbs electromagnetic energy at 260 nm
- Protein absorbs at 280 nm
- 260/280 ratio indicates purity
  - Highly purified DNA has an A_{260}/A_{280} of 1.8. (1.8 – 2.0 desired)
  - < 1.8 indicates substantial protein or phenol contamination
    - Pure protein ratio = 0.6
  - Totally pure RNA has an A_{260}/A_{280} of 2.0
  - RNA in the DNA is detected as DNA → inflated [DNA]
    - RNA can be degraded, either chemically or enzymatically, prior to measurement

From Bio219 Lab 4: Estimating quantity using the UV Spec

50 µg/ml DNA has an absorbance of 1.0 at 260 nm

The concentration of any sample of double stranded DNA can therefore be calculate using the following formula:

[ds DNA] = A_{260} nm x 50 µg/ml x d. f.

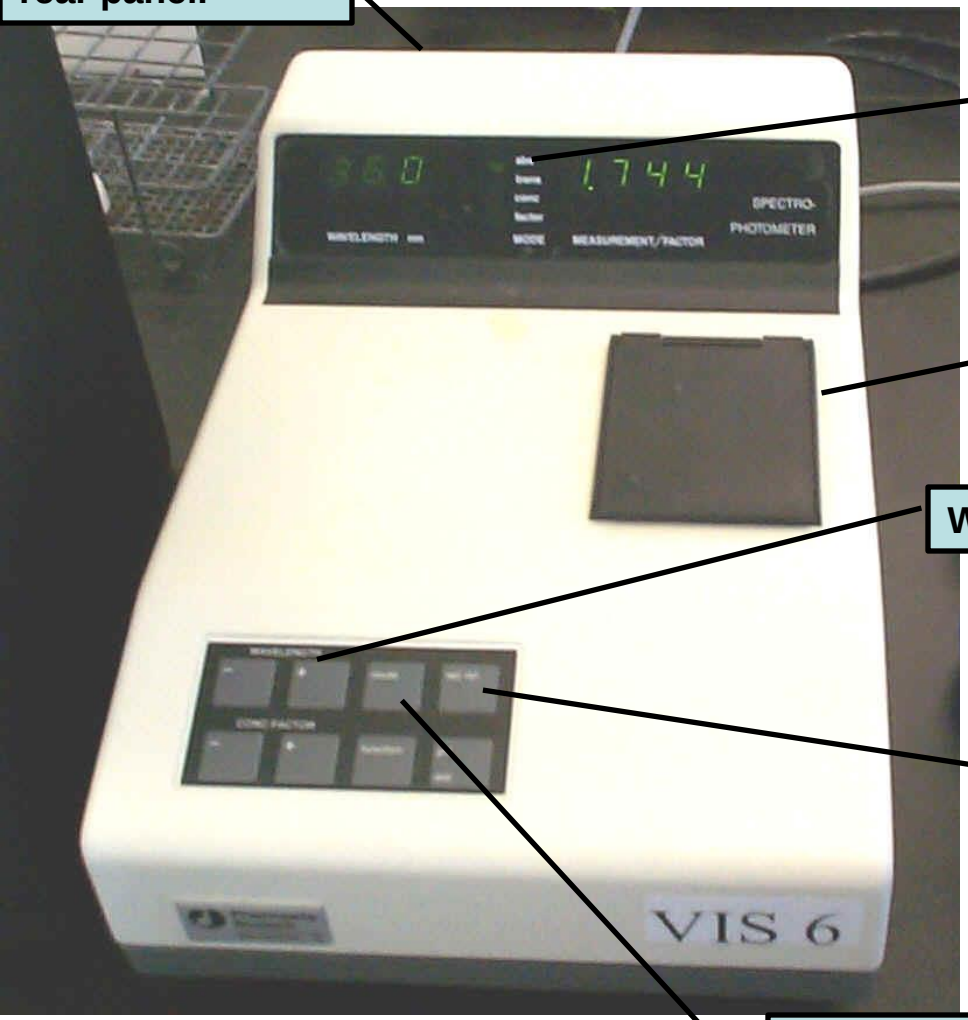
From Bio 219 Lab 4:
Estimating quantity using the UV Spec

Example: 10 **µl** of ds DNA was added to 1 ml of water in a cuvette. The A_{260} was 0.021. What is the concentration in µg/ml of the original, undiluted sample?

Answer: The dilution is 10 µl/1000 µl = 1/100

0.021 x 50 µg/ml x 100 = <u>105 µg/ml</u>

Spectrophotometer: VIS, Novaspec II, GE/Amershame/Pharmacia Biotech



On/Off Toggle on rear panel.

Mode Settings:
Abs
Trans
Conc
Factor

Door: Open to insert Blank/Reference or Sample

Wavelength: + or – to adjust

Set Ref: Used to cause a read of the "blank" for reference

Mode Button: Use to select Abs, Conc, Trans, Factor

TECHNICAL SPECIFICATIONS
Wavelength range: 330-800 nm
Bandwidth: 7 nm
Absorbance range: -0.300 to 2.50

Spectrophometer: VIS, General Operating Protocol

A. Push the On/Off toggle button on the rear to turn on the machine. It will then display CALC and cycle from 1,2,3, then ---- to indicate system calibration is complete.

1. Press "+" or "-" wavelength buttons to set the desired wavelength. Press +/- to change CONC or FACTOR.

2. Press "MODE" button to cycle display to: ABS, TRANS, CONC, or FACTOR. Set mode to ABS is recommended.

3. Fill a BLANK cuvette at least ¾ full with distilled water and wipe outside of cuvette with a tissue to ensure it is clean and dry.

4. Insert the cuvette completely into the compartment orienting the line on the cuvette with the mark on the sample compartment .

5. Close the sample compartment cover and press "SET REF" to zero instrument. ABS will be 0.0 after this operation, Trans =100, Conc=.001.

6. Remove the cuvette and fill a cuvette at least ¾ full with SAMPLE and wipe outside of cuvette with a tissue to ensure it is clean and dry.

7. Insert the cuvette completely into the compartment orienting the line on the cuvette with the mark on the compartment.

8. Close the compartment cover and a new reading for the SAMPLE will be displayed. Read and record the absorbance values.

9. Every time the wavelength is changed the instrument must be re-zeroed using the SET REF button.

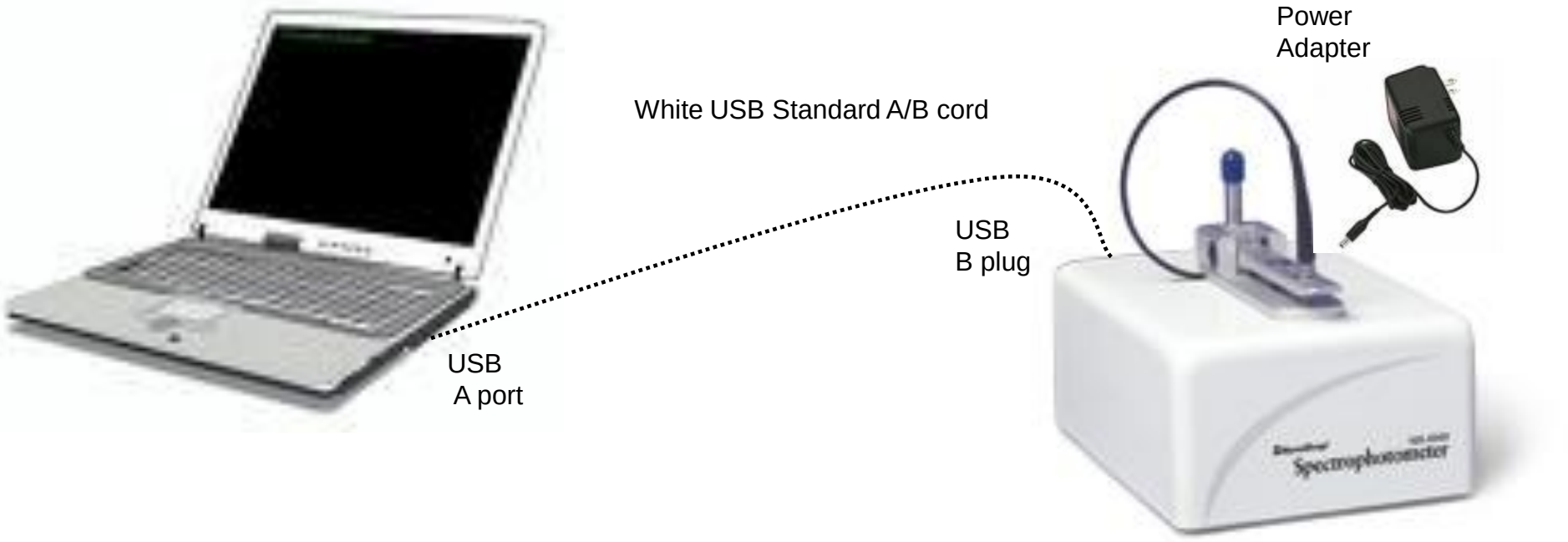
Spectrophotometer: VIS only, Novaspec III, or Plus (Planning info only)

NOVASPEC III	**80-2118-00**	**VWR CAT# 97058-518**	**Each $2,335.00**
NOVASPEC PLUS	**80-2117-50**	**VWR CAT # 97058-500**	**Each $2,735.00**

NOVASPEC PLUS
Supplier: GE Healthcare
Novaspec* Plus Visible Spectrophotometer^ Wavelength range, nm: 330–830 nm, Absorbance range, A: -0.3–2.500, Wavelength accuracy: +/- 2 nm, Optical system: Single beam, monochromator

Spectrophotometry: Nanodrop

Spectrophotometry: NanoDrop, Instrument Setup Illustration



Spectrophotometry: NanoDrop,Hardware Setup Protocol

1. **Use the bench CPU Host or checkout #3 or #4 or the Staff laptop as they are the only ones presently loaded with the Nanodrop Application Software**

2. **Locate a Nanodrop device from the bottom drawer cabinet under the CEQ 8000 Genetic Analyzer device**

3. **Retrieve a Nanodrop power adapter (black) and USB (white) cable from the same area**

4. **Connect the power adapter to a 110 volt outlet and then to the round port on the Nanodrop device**

5. **Connect the white USB cord from the Nanodrop device to a USB port on the Host CPU.**

6. **Also connect a Flashdisk to the Laptop if you want to transport report data for further analysis and printing**

Spectrophotometry: NanoDrop, Software, Main Menu

Link to Nanodrop User Manual – (pdf)

Spectrophotometry; NanoDrop, Test Protocol

1. **Double click the NanoDrop Software icon from the Host/Laptop desktop**

2. **Follow the on screen procedures (page #4) to select the type of Sample being tested**

3. **Open the Nanodrop switch blade reader (arm) and wipe the bottom and arm pedestal surfaces clean of any solution or lint/debris. Close the arm to the down position.**

4. **The System will perform initialization procedures and then ask for a "BLANK" test**

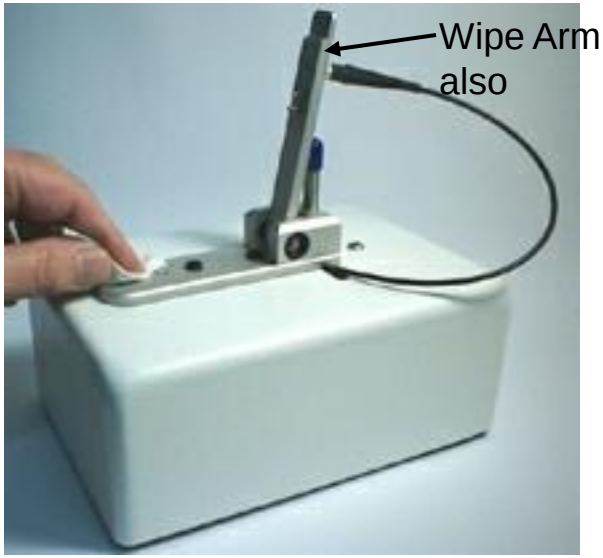
5. **Pipette < 2 uL of SAMPLE on the reader and inspect to see that a good bead of the sample is formed. If the Sample is not beaded, wipe clean and pipette again.**

6. **Select the "MEASURE" button on the screen and the test will run automatically**

7. **Examine the plot and concentration data displayed on the Screen. Write down any important data and proceed.**

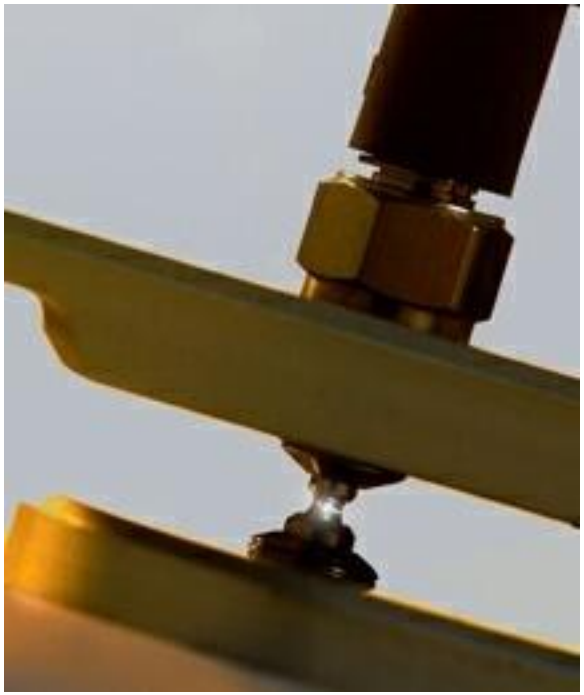
8. **Continue with further samples as required**

Spectrophometry; NanoDrop, Technique Illustrations



Wiping Lower Pedestal
Before and After Each Test

Bead Supported by
Surface Tension before
“Measure” command



Spectrophotometry; NanoDrop; Save Report Protocol

1. After all samples have been run, on the Main Screen select Show Reports

2. Select the Reports Tab at the top of the screen

3. Select the "Save Report" button

4. Select "Export Report Table Only" button to save the current report data to a neutral file format (.txt)

5. Save the Report.txt file to your flashdisk or another file to email it to another computer for further analysis or printing

Spectrophotometry; NanoDrop Import Saved Report.txt file to Excel

1. **On a computer with MS Office and printer access, install the flashdisk or download the exported file from Email.**

2. **Open the Excel application and select DATA in the top toolbar**

3. **Select "Import External Data" from the drop down menu**

4. **Select "Import Data"**

5. **Locate the report.txt file on the flashdisk or other media and open the file**

6. **Follow the Excel file import procedures, select the "Delimited" option, then “Next” and “Finish” to import the file**

7. **Review the Report data in the Excel spreadsheet, adjust column widths as needed**

8. **Save the Excel file to the flashdisk or other location for processing and printing**

Spectrophotometry; NanoDrop;Troubleshooting; Ratio Error Messages

1. **If you get a message similar to "Ratio between long and short path out of tolerance", use this procedure**
2. **Residue has likely collected on the pedestals (lower and/or arm) from previous use**
3. **Place >2uL of dH2O on the pedestal, close the arm, press down lightly on the arm for 2 min**
4. **Wipe the pedestals and repeat the water soak procedure**
5. **Wipe the pedestals >30 times (lower and arm) with a clean lab wipe**
6. **Place a <2uL bead of dH2O on the lower pedestal and look for a good bead of water**
7. **Retest with your sample, if the problem persist, the pedestals need to be reconditioned**

Spectrophotometry: NanoDrop;Troubleshooting Reconditioning the Pedestals

1. **Locate the PR-1 Reconditioning Kit in the Nanodrop drawer**
2. **Use the supplied applicator, apply a pin-size drop of the compound on the lower and arm pedestals**
3. **Spread the amount around with the applicator and let it dry 30 seconds**
4. **Using a folded clean lab wipe, remove the PR-1 compound by rubbing vigorously the lower and arm pedestals. Be careful not to put too much pressure on the arm while rubbing.**
5. **The appearance of a black residue on the wipe is normal, use another wipe and continue**
6. **Test the effectiveness of the reconditioning by pipetting a <2 uL sample of dH2O and look for a good bead**
7. **Resume testing with samples**

Spectrophotometry: Nanodrop Calibration

The Calibration Check is found within the Utilities and Diagnostics module and is accessed through the Main Menu. It is used to confirm that both pathlengths are within calibration specifications.

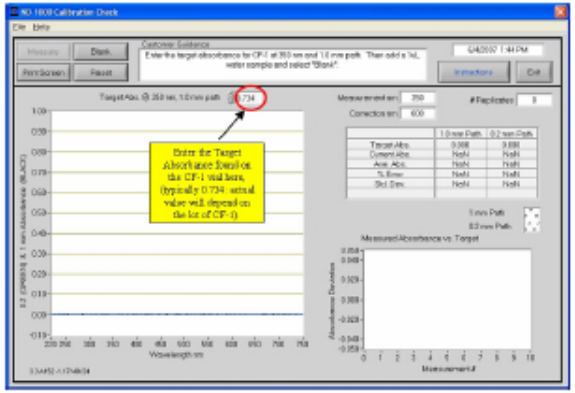
A vial of CF-1 is required to run the calibration check procedure. CF-1 is an aqueous potassium dichromate ($K_2Cr_2O_7$) solution for use in confirming calibration of NanoDrop® Spectrophotometers. It is roughly ten times more concentrated than other commercially available $K_2Cr_2O_7$ solutions used to confirm calibration of standard spectrophotometers and is available through NanoDrop technologies or your local distributor.

Procedure

Ensure the measurement pedestals are clean and that a 1ul water sample "beads" up on the lower pedestal.

1.) Open the ND-1000 Calibration Check Software and follow the prompts in the Customer Guidance text box of the software.

2.) Enter the Target Absorbance found on the CF-1 vial as directed in the image below, Typically the target absorbance is 0.734; the actual value will depend on the lot of CF-1.



NOTE: The CF-1 Calibration Fluid is supplied in a single use vial. The CF-1 must be used within one hour of opening the vial. Exposure to the environment or transferring of the fluid to another container may cause a significant change in concentration.

3.) Add 1ul of deionized water and select "Blank".

4.) Before opening the ampoule of CF-1 Calibration Fluid, shake vigorously to ensure solution is thoroughly mixed. Ensure all solution is collected in the bottom portion of the ampoule.

5.) Carefully break the neck of the ampoule to open the CF-1 Calibration Fluid.

6.) Follow the on-screen prompts in the Customer Guidance text box. Using individual 1ul aliquots of the CF-1 Calibration Fluid, measure 10 replicates. After the 10th measurement, the calibration check results will be displayed on-screen in the Customer Guidance text box.

7.) If the instrument does not pass the calibration check using 1ul samples, immediately repeat the procedure again (step 6) using 2ul samples.

To print a copy of the results for your records, click the "Print Screen" button. A .JPG of the final results is automatically archived on the hard drive at: *C:\NanoDrop Data\Calib check*

If recalibration is required, please contact NanoDrop Technologies @ 302-479-7707 or send at email to info@nanodrop.com.

Spectrophotometer: Nanodrop, Calibration Kit Step 1/2

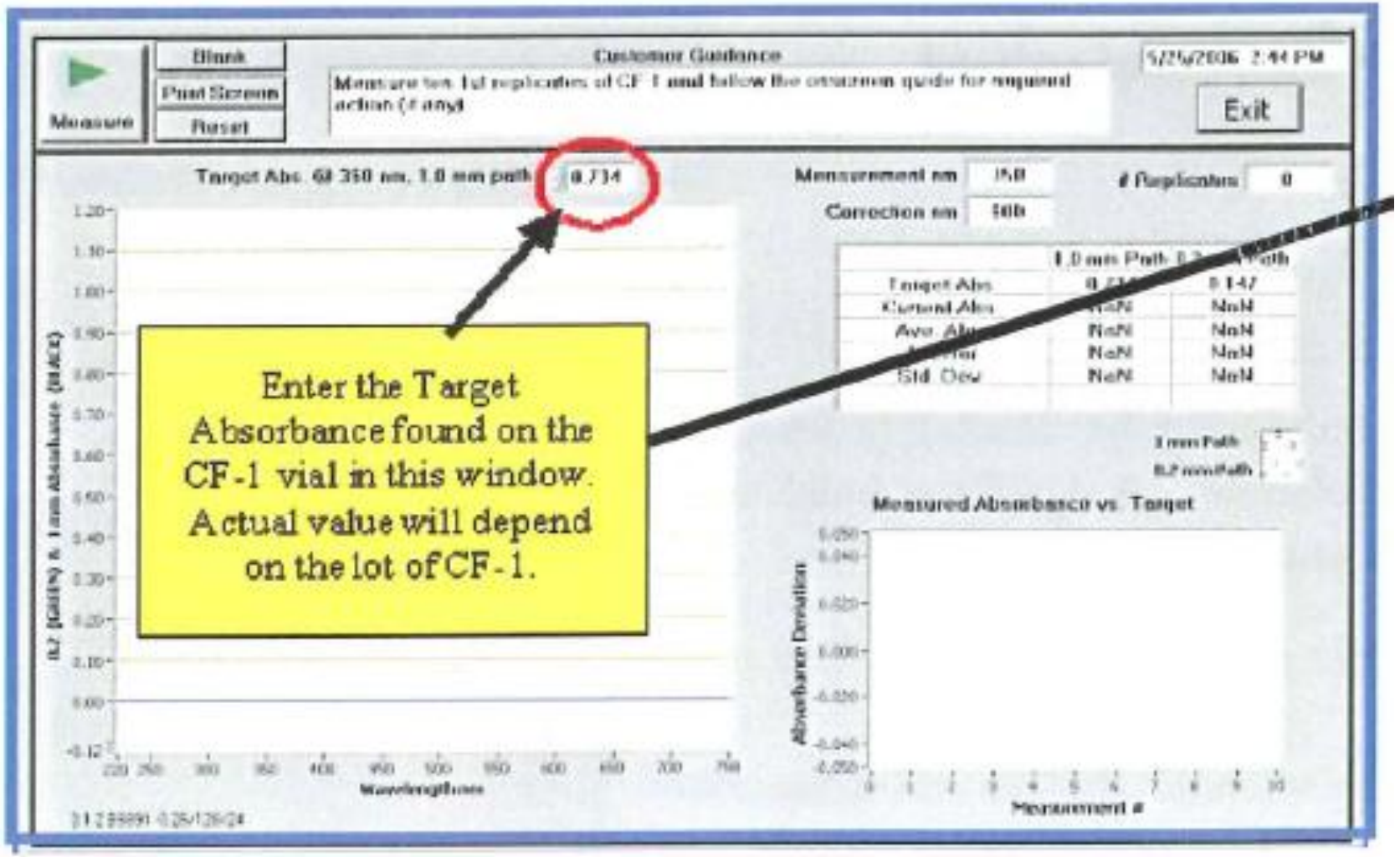
A vial of CF-1 (aqueous potassium dichromate ($K_2Cr_2O_7$) solution) is required to run the calibration check procedure for the Thermo Scientific NanoDrop 2000/2000c and NanoDrop 1000 Spectrophotometers.

Procedure

1. Ensure the measurement pedestals are clean and that a **1ul** water sample "beads" up on the lower pedestal.
2. Remove any lint build-up from around the instrument solenoid by following the instructions on the back page of this document. (Applies to NanoDrop 1000 only.)
3. Open the Calibration Check Software and follow the prompts in the Customer Guidance text box of the software.
4. Enter the Target Absorbance found on the CF-1 vial as directed in the images below.
5. Add **1ul** of deionized water and select "Blank".
6. Before opening the ampoule of CF-1 Calibration Fluid, shake vigorously to ensure solution is thoroughly mixed. Ensure all solution is collected in the bottom portion of the ampoule.
7. Carefully break the neck of the ampoule to open the CF-1 Calibration Fluid.
8. Follow the on-screen prompts in the Customer Guidance text box. Using individual **1ul** samples of the CF-1 Calibration Check Fluid, measure 10 replicates.
9. After the 10th measurement, the calibration check results will be displayed on-screen in the Customer Guidance text box. If the instrument does not pass the calibration check using **1ul** samples, immediately rerun the procedure (step 8) using **2ul** samples.
10. The NanoDrop™ 2000/2000c software will archive the results in the autosave file at *C:\Documents and Settings\All Users\Documents\Thermo\NanoDrop2000\AutoSave\CalibCheck*.
11. The NanoDrop 1000 software will archive the results will in the NanoDrop data folder at: *C:\NanoDrop Data\Calib check.*.
12. If using the NanoDrop 1000 calibration check specific software downloaded from our website, the results are not automatically archived and must be manually saved to retain a record.
13. If recalibration is required, contact us @ 302-479-7707 or by email at nanodrop@thermofisher.com.

Note The CF-1 Calibration Fluid is supplied in a single use vial. The CF-1 must be used within one hour of opening the vial. Exposure to the environment or transferring of the fluid to another container may cause a significant concentration change.

Spectrophotometer: Nanodrop, Calibration Kit Step 2/2



NanoDrop 1000 Calibration Check Screen

Thermo
ELECTRON CORPORATION

PACKING LIST

Thermo Electron Scientific Instruments LLC
5225 Verona Road
Madison, WI 53711
(608) 276 6100

Page
1 / 1

Delivery Number
83071284
Customer Purchase Order Number/Date
DR3680388 / 03/13/2013
Sales Order Number / Date
180405471 / 03/13/2013
Sold To Customer
1145990

Bill To No : 1145990
THERMO FISHER SCIENTIFIC LLC
PO Box 1768
PITTSBURGH PA 15230

Ship To No : 1145990
ST LOUIS COMMUNITY COLLEGE
RICHARD NORRIS / REF# P1305796
BRDG PARK AT DDPSC/PLANT & LIFE SCI
1005 N WARSON RD, RM #122
ST LOUIS MO 63132

Spectrophotometer: Nanodrop, Cal Kit Ordering

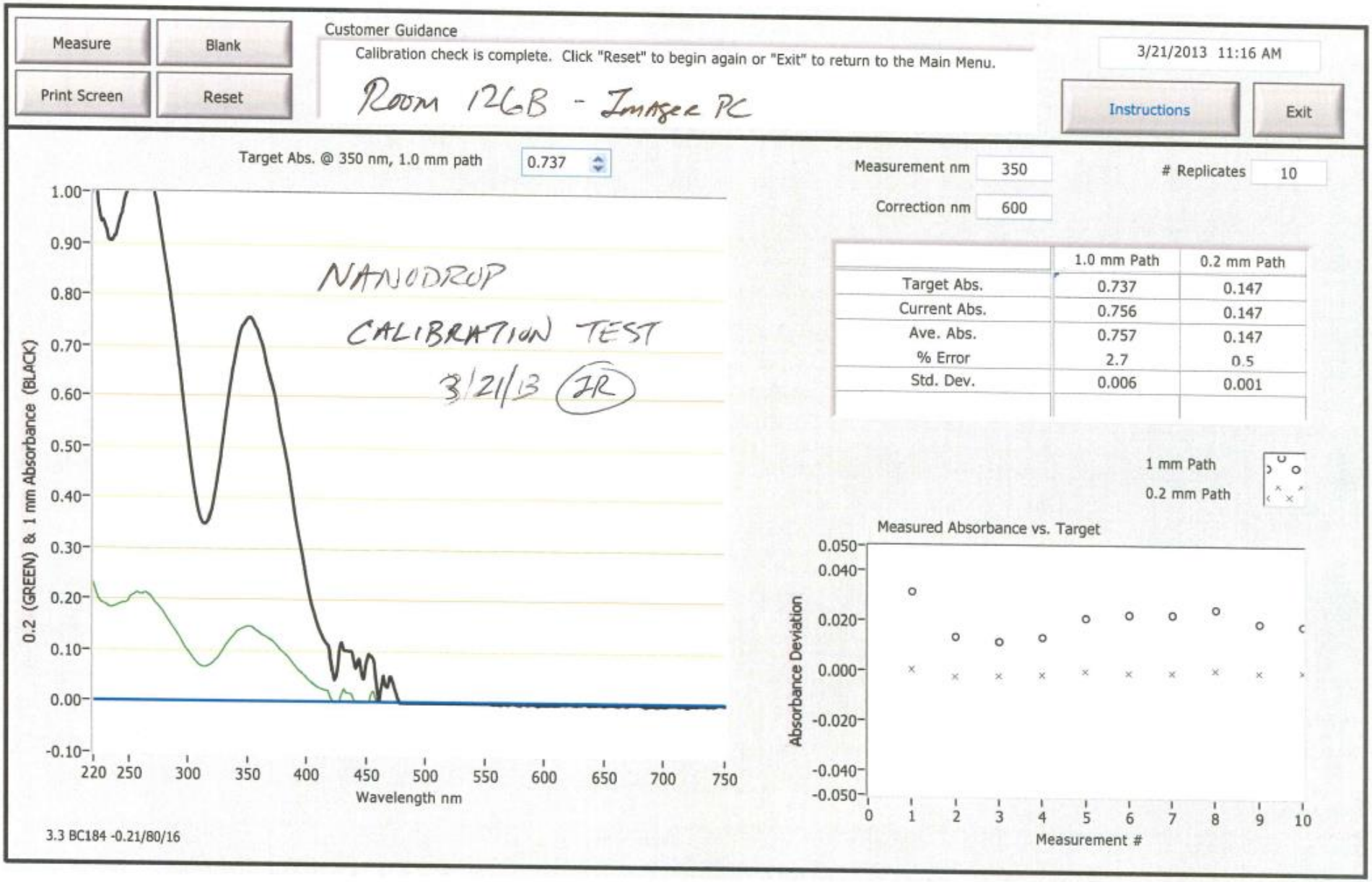
Bill of Lading No	: 550525727413
Date Shipped	: 03/18/2013
Carrier	: Fed Ex Second day
Incoterms	: 6 - Origin - Collect
Total Weight	: 1.000 LB
Number of packages	: 00001

PLEASE SHIP FEDEX ACCT# 260751441

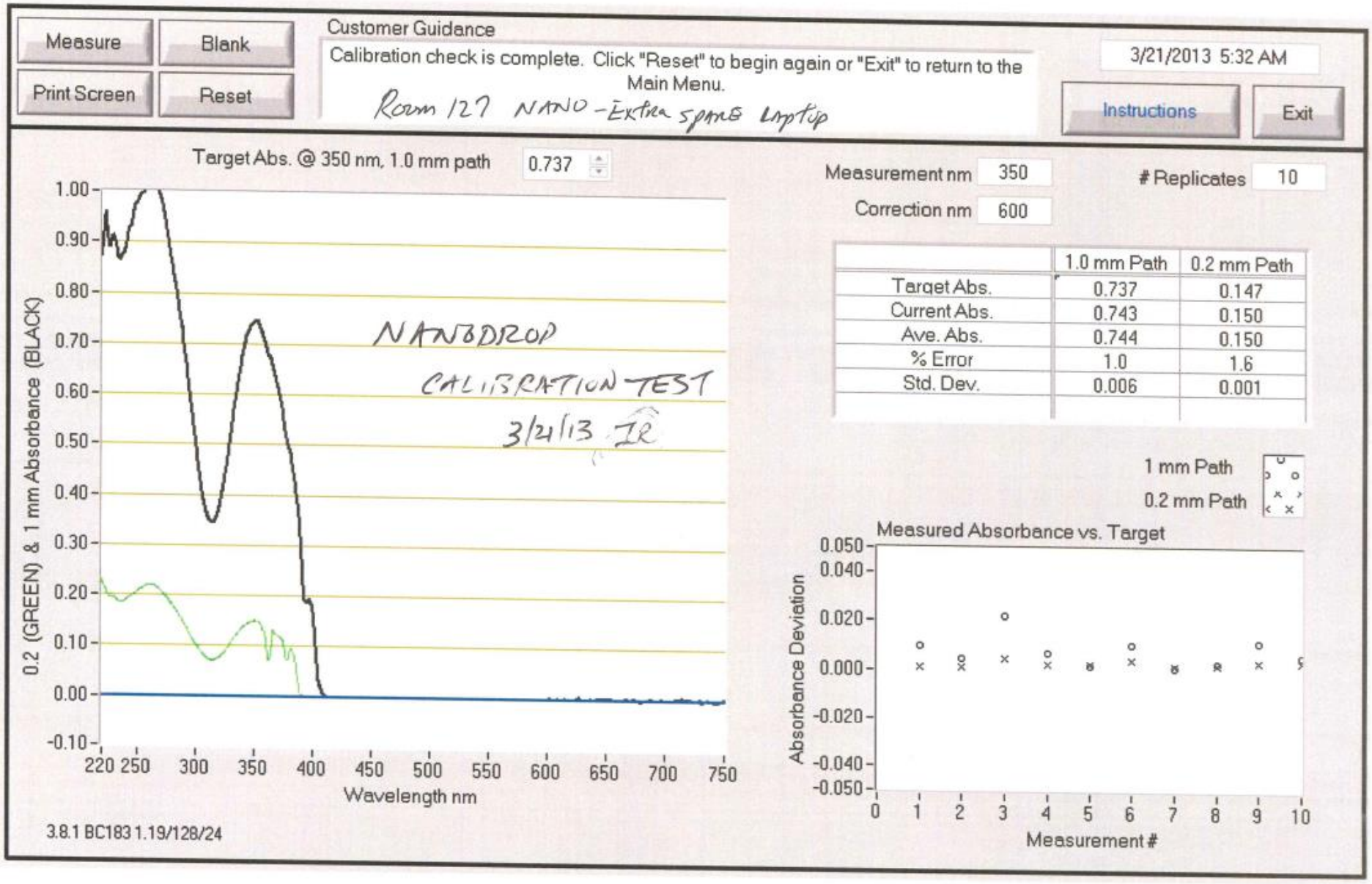
tem	Material Serial No	Description	Qty Shipped	Qty Backlog
010	CHEM-CF-1 Order No: 180405471	CF-1 CALIBRATION FLUID	4 EA	

RBM 3/21/13

Spectrophotometer: Nanodrop, R126B Latest Calibration Test Results



Spectrophotometer: Nanodrop, R127 Latest Calibration Test Results

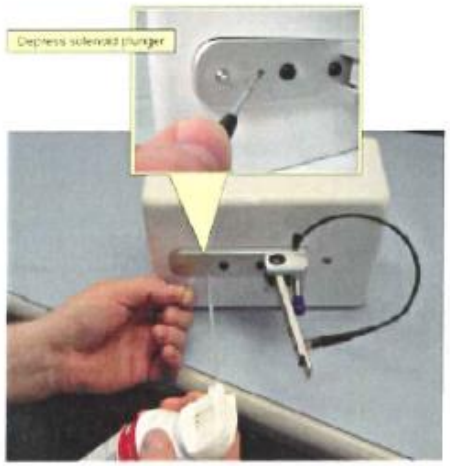


Spectrophotometer: Nanodrop, Solenoid Cleaning

Solenoid Cleaning (NanoDrop 1000 only)

Field experience has shown that some brands of lab wipes may shred during the cleaning process and may which could result in a build-up of lint under the instrument solenoid . A significant build-up of lint may alter the absorbance pathlength, resulting in erroneous measurements.

1. Lay the instrument on its side with the source fiber (black fiber optic cable) facing up and open the sampling mechanism. (Refer to the image on the right)
2. Using a paperclip or a small screwdriver, manually depress the solenoid plunger and spray compressed air down the solenoid plunger hole. Be sure to keep the can of compressed air upright so as not to spray the propellant into the instrument.



For Technical Support, contact us at 302-479-7707 or nanodrop@thermofisher.com.

Rev 2/09

Spectrophotometer: SmartSpec Plus, Bio-Rad

The UV/visible SmartSpec Plus spectrophotomer has a working wavelength range of 200–800 nm. It is the perfect tool for routine applications such as:

- Quantitation of DNA, RNA, and oligonucleotides
- Quantitation of proteins via the Bradford, Lowry, and BCA assay methods
- Monitoring bacterial culture growth
- Simple kinetic assays
- Wavelength scans with peak detection

A simple, menu-driven interface simplifies assays and provides answers to common sample computations at the touch of a button. Conversion factors can be stored and modified. The SmartSpec Plus spectrophotometer is capable of performing calculations and providing results such as:

- A_{260}/A_{280} ratio for nucleic acid purity
- Quantitation that takes dilution factors into account
- Sample concentration in µg/ml (additionally in pmol/µl for oligonucleotides)
- Molar extinction coefficient and molecular weight of oligonucleotides

Link to Bio-Rad SmartSpec Plus User Manual – (pdf)

Spectrophotometer: SmartSpec, Quick-Start Guide pg 1

1. Power up the instrument. It will go through system status check and display an error message if there are any problems.
2. Press one of the Assay buttons.
   A. DNA/RNA.
      i. Choose type of nucleic acid
         a. dsDNA, ssDNA or RNA: accept or modify the conversion factor
         b. DNA oligo or RNA oligo: input molar extinction coefficient and molecular weight, otherwise choose method for SmartSpec Plus to estimate these values.
      ii. Choose whether to subtract background and, if so, specify background wavelength.
   B. Protein
      i. Choose type of assay.
         a. Bradford. Measure absorbance at 595 nm.
         b. Lowry. Measure absorbance at 750 nm.
         c. BCA. Measure absorbance at 562 nm.
         d. UV. Measure absorbance at 260, 280, and 320 nm.
         e. Other. User specifies the wavelength to read.
      ii. Choose standard curve option.
         a. Create a new standard curve.
         b. Recall a standard curve from memory.
         c. No standard curve. SmartSpec Plus will not be able to convert absorbance to concentration.

Spectrophotometer: SmartSpec, Quick-Start Guide pg 3

C. Scan

   i. Set upper and lower limits of scan. (200 nm to 800 nm)

   ii. Choose whether to subtract background and, if so, specify background wavelength.

   iii. Choose fast or slow scan.

   iv. For the fast scan, choose number of successive scans.

D. Kinetic

   i. Choose wavelength to read.

   ii. Choose duration of data collection.

   iii. Choose interval between successive readings.

   iv. Choose whether to subtract background and, if so, specify background wavelength.

E. OD600

   i. Accept or modify the conversion factor.

F. λ

   i. Choose number of wavelengths to read.

   ii. Specify the wavelengths to read.

   iii. Choose whether to subtract background and, if so, specify background wavelength.

Spectrophotometer: SmartSpec, Quick-Start Guide pg 4

3. If your dilution factor is not 1.0, set the dilution factor.
4. Zero the instrument. Place a cuvette containing the blank solution into SmartSpec Plus and press **Read Blank**.
5. Collect absorbance data. Place cuvette containing sample solution into SmartSpec Plus and press **Read Sample**. Continue collecting absorbance data until all samples are read.
6. Absorbance and/or concentration data are displayed automatically as they are collected. If there are absorbance data at other wavelengths, press **Abs** to see them. DNA or RNA oligo concentrations are available in units of µg/ml and pmole/µl; press **Conc** to toggle between them. If absorbance or concentration data area displayed, press Enter to return the Ready screen, or simply put the next sample cuvette into SmartSpec Plus and press **Read Sample**.
7. After last sample, press left arrow key to exit assay.
8. For protein assays, save the standard curve (if you made a new one) and print the full report.